MARINE REVIEW

WEEKLY.] AND MARINE RECORD. [ESTABLISHED, 1878.

Vol. XXVI | Published every Thursday at 39-41 Wade Bldg by the Marine Review Pub. Co. | CLEVELAND, O., OCT. 9, 1902. | Subscription $3.00 year. Foreign $4.50 year. Single Copy 10 cents. | No. 15

Eastern Office, 1023 Maritime Bldg., New York City.
Chicago Office, 373 Dearborn St.

[Entered at Cleveland Post Office as second-class matter.]

MORGAN STEAMSHIP COMBINATION FORMED.

The International Mercantile Marine Co. is the name of the corporation under which the Atlantic steamship combination is to be carried out. The charter is in the form of an amendment to the charter of the International Navigation Co. As a preliminary step all the officers and directors of the International Navigation Co. had resigned during the preceding week. The capital stock is increased to $120,000,000, equally divided between preferred and common. The preferred stock is cumulative at 6 per cent. The amended charter follows closely that of the United States Steel Corporation, the amendments having been adopted at a meeting of the directors of the original company held on Sept. 17 and subsequently ratified by the stockholders. By these amendments it was provided that the company should issue bonds aggregating $75,000,000, to be known as 4½ per cent mortgage and collateral trust gold bonds, all equally secured by a mortgage and deed of trust on the company's property. The existence of the company is made perpetual. Provision is made that the dividends on the common stock shall not in any year exceed 10 per cent until all the bonds are retired.

Mr. Clement A. Griscom, president of the old International Navigation Co. is to be president of the new company. Following are the directors and committees:

Directors—C. A. Griscom, P. A. B. Widener, B. N. Baker, John I. Waterbury, George W. Perkins, E. J. Berwind, James H. Hyde, Charles Steele, W. J. Pirrie, J. Bruce Ismay, Sir Clinton E. Dawkins, Henry Wilding and Charles F. Torrey.

Executive and finance committee—C. A. Griscom, P. A. B. Widener, George W. Perkins, Edward J. Berwind and Charles Steele.

British committee—Sir Clinton E. Dawkins, chairman; the Right Hon. W. J. Pirrie, J. Bruce Ismay, Henry Wilding and Charles F. Torrey.

An underwriting syndicate was formed some time ago to underwrite $50,000,000 of the 4½ per cent bonds of the shipping combination. The majority of these subscriptions came from New York. It is a significant thing that none of the stock of the new company is to be offered to the public—a pretty sure indication that the underlying companies have faith in it. No further announcement has been made as to the lines to be incorporated into the company but it is generally understood that they are the American and Red Star Lines, the White Star Line, the Leyland Line, the Atlantic Transport Line and the Dominion Line. The attitude of the British government to the combination appears to be friendly. At any rate such is the impression to be gathered from the speech of Mr. Gerald Balfour, president of the board of trade, which is closely affiliated with the government. The fact that the British government has seen fit to increase its subsidy to the Cunard Line is not looked upon as a hostile move. The subsidy is really only increased from $450,000 to $750,000, and some of the ships in the American company, notably the White Star liners, are obtaining support from the British government.

An agreement appears to have been made between Mr. Morgan and the British government whereby the British lines in the combination are to remain British in name and reality—that is the vessels are to fly the British flag and are to be officered by British subjects. The British government undertakes to treat the lines the same as other British companies. A further agreement is to the effect that half the tonnage built for the combination hereafter shall fly the British flag. The tone of the English papers is friendly to the combination, and Ambassador Choate in a speech declared that community of interest was the tie which had bound these two great peoples together for the last hundred years and he hoped it would continue for the next thousand.

BRITISH GOVERNMENT ASSISTS CUNARD LINE.

The British government has come to the support of the Cunard Line, in so far as it has increased the subsidy paid for services performed from $450,000 to $750,000. The government has also undertaken to advance the money to build two express steamers which are to be faster than anything now afloat. The loan will be secured by a mortgage upon the company's fleet and will bear interest at the rate of 2¾ per cent. It is to be repaid within twenty years from the date of the completion of the second vessel. The company pledges itself to remain a purely British undertaking. It will hold its whole fleet at the disposal of the government, which is at liberty to purchase it at agreed rates. The company agrees not to raise freights unduly or to give preferential rates to foreigners. It is understood that the new steamers are to make between 24 and 25 knots an hour.

It is understood that plans for the construction of a new steamer for the New York, New Haven & Hartford railway have just been completed and it is expected that the work will shortly be proceeded with.

PRESIDENCY OF THE STEEL CORPORATION.

It is now two months since Mr. Charles M. Schwab, president of the United States Steel Corporation went abroad on his vacation, since which time the newspapers appear to have left him severely alone. Numerous stories were afloat regarding his physical condition at the time of his departure and it was freely stated that what Mr. Schwab needed was a long rest. The newspapers represented that he had broken down under the nervous strain that had been put upon him and that he would require time to recuperate; but none of them was so bold as to intimate that his departure meant his virtual relinquishment of the presidency of the Steel Corporation. None of them has said so since; they have all dropped Mr. Schwab in the whirl of other things. Yet a close student of the workings of the Steel Corporation might readily conclude that Mr. Schwab's vacation is but the prelude to the abandonment of active office; that he will probably never return to the corporation. Mr. Schwab needs no apologist. He has done remarkably well. He is one of the most extraordinary men in public life, for we must regard his great office as of a quasi-public character. He combines marked executive ability with great mechanical skill. These two qualities are rarely found in combination. His mechanical skill placed him at the head of the Carnegie company; his executive ability at the head of the Steel Corporation. When the corporation was formed the minority holders of Carnegie stock placed their affairs wholly in his hands. This is confidence of the highest order. He must have done an immense amount of work during the year of his tenure of office; but Mr. Morgan's work must have been of a far more nervous order, for he was directly charged with the financial establishment of the enterprise. If any man should have broken down nervously it is Morgan; yet Morgan has apparently not molted a feather in floating all of his undertakings. Why, therefore, should a younger, and naturally more robust man, need a long vacation after twelve months of work? It is clear that there is something back of it all. Mr. Schwab, after all, could not have been the man for the place. A little inquiry will suffice to show that he has never been the choice of the most powerful interests in the Steel Corporation. It is not likely that he was Mr. Morgan's original choice. He was, however, Mr. Carnegie's choice and without the consent of Mr. Carnegie the Steel Corporation could not have been formed. It was comparatively easy for Mr. Carnegie to dictate who the president of the Steel Corporation should be, and as he had had a quarrel with Mr. Frick the only man he could turn to was Schwab. He named Schwab, but probably it is no secret to say that the conservative element, foremost among whom must be named the Rockefeller interests, wanted Frick. The Rockefeller interests in the corporation are immense. Few people realize their extent. The most valuable asset which the Steel Corporation has, was turned over to it by Mr. Rockefeller. We refer to the group of iron mines on the Mesabi range. In addition were the railways and the ships, and the Rockefeller holdings, not inconsiderable, in the subsidiary companies. It is no secret to say that this enormous investment has had no recognition in the active management of the corporation. The organization of the corporation has been Carnegie throughout. Carnegie selecting the president and the president selecting his associates. It would be strange, indeed, if these interests did not scrutinize Mr. Schwab closely. This is not saying that he has been antagonized or opposed, for no one would put obstacles in his way; but he has been most narrowly watched. To those who have noted the progress of the corporation it would be more surprising to see Mr. Schwab return to its head than it would be to see him definitely resign.

As to who will succeed him is another matter. Mr. Frick is the most likely man. But Mr. Frick is enormously wealthy, having more money than any man can ever have use for, and moreover has had all the honors that office can bring. He has taken up many big things of late. Morgan dictation would probably not be agreeable to him. He might not want the presidency of the Steel Corporation.

Mr. David C. Reid of New York has been chosen president of the Harlan & Hollingsworth Co., now one of the underlying companies of the United States Ship Building Co. Mr. W. de W. Dimock was elected secretary and Mr. T. Jackson Shaw, treasurer. Mr. Reid is identified with a number of maritime enterprises and has had long experience as a ship builder. He was for sixteen years with the Harlan & Hollingsworth Co. and has since served with the Crescent ship yard at Elizabethport, N. J. He has latterly been connected with the American Mail Steamship Co.'s fleet of steamers, running in conjunction with the United Fruit Co.'s West Indian service.

ENGLAND'S BIG BATTLESHIPS.

Interesting Particulars of the Largest Vessels of their Class in the World—Contracts for "Scouts"—Scottish Letter.

Glasgow, Sept. 27.—Messrs. John Brown & Co. Ltd., Clydebank, have this week received orders to build the only battleship to be given out to contract under the 1902 admiralty program. The new battleship will resemble the Commonwealth building at the Fairfield Co., the Dominion under construction at Vickers' works at Barrow-in-Furness, and the King Edward VII., laid down some months ago at the Devonport dock yard. These five battelships will be the largest in the British navy, and will excel any other vessel of the class. Following are the dimensions: Length between perpendiculars, 425 ft; beam, 78 ft.; draught, 26 ft. 9 in.; displacement, 16,350 tons. The largest ship of any fleet at present is 15,200 tons. The new ships in addition to having two 12-in. guns in the forward central barbette and two similar guns in the after barbette, will have four 9.2-in. guns, each mounted within a barbette located at each of the corners of the citadel on either side, a little abaft of the central barbettes, so as to enable them to fire ahead and on the broadside with a considerable degree of training abaft the beam. There will also be ten 6-in. guns, all well protected behind the broadside and bulkhead armor. The depth of the broadside armor will be about 22 ft. instead of 15 ft. as in previous ships, while the thickness is 9 in. on the water line, decreasing to 7 in. at the upper deck, and at the forward end by gradual stages to 3 in., which is the thickness at the ram.

The Clydebank battleship's engines are to develop 18,000 I. H. P. to give a speed of 18½ knots. In two of the contract ships the boilers are to be entirely of the Babcock & Wilcox type; in the King Edward, to be engined by Messrs. Harland & Wolff, three-fifths of the power will be got from the same system of steam generators, and the remainder from tank boilers. In that to be engined by Messrs. Humphreys, Tennant & Co., the Niclausse boiler will be adopted for four-fifths of the power, and for the other fifth Howden's cylindrical boilers will be used; while in the ship to be built at Clydebank, Babcock & Wilcox boilers will be fitted for four-fifths and closed stokehold forced draft boilers for the remainder. There will be eighteen Babcock & Wilcox boilers of 39,000 sq. ft. heating surface and 1,120 sq. ft. of grate, while the three cylindrical boilers will have 8,100 sq. ft. of heating surface and 243 sq. ft. of grate, making a total of 47,100 sq. ft. of heating surface and 1,363 sq. ft. of grate. In the dock yard built ship the total heating surface will be 45,600 sq. ft., the difference being due to the eighteen Niclausse boilers having 37,500 sq. ft., the cylindrical boilers being in this measurement similar to those in the other ship. The Niclausse boilers have more grate area than the Babcock & Wilcox, 1,150 sq. ft., but the cylindrical boilers are the same, 243 sq. ft. The total grate area is 1,393 sq. ft.

The weight of the machinery in the case of the Dominion and Commonwealth with all boilers of the water-tube type will be approximately 1,735 tons, that of the new Clydebank ship, 1,750 tons and that of the new dock yard ship 1,765 tons. The difference is due to boilers, the machinery being the same, and in the case of the ships in which the combination is adopted the difference against the dock yard ship is almost solely due to the cylindrical boilers. The engines are to be of the triple-expansion type, with four cylinders and four cranks, the diameters being respectively 38 in., 60 in., 67 in. and 67 in., with a stroke of 48 in. The working steam pressure is to be 210 lbs.

CONTRACTS FOR "SCOUTS" TO BE PLACED.

Contracts for the four new "scouts" will shortly be placed. Each firm tendered to their own design, the speed of 25 knots on an eight hours' run being practically the only decided stipulation made in the invitation to submit designs. The admiralty idea was that a vessel of from 700 to 900 tons displacement would suffice, but the designs sent in varied from about 1,700 tons up to 3,200 tons, on the assumption that a "scout" must be as capable of keeping the sea as the largest and heaviest warship, and at the same time attain her full speed under the most adverse conditions. The ship builders most experienced in naval design have pronounced in favor of the larger vessel. A 700-ton ship would certainly cost less than one four times the size, but small craft were not very successful in the case of the vessels of the Rattlesnake and Sharpshooter class. The new vessels will probably be about 370 ft. long, with a displacement of about 2,800 tons, which, with engines of 17,000 I. H. P. and boilers of the express small-tube type, should enable the speed of 25 knots to be realized under all conditions.

POOR OUTLOOK FOR SHIPS.

There is no improvement in the freight market, and there is no appearance of renewed desire on the part of cargo-boat owners to increase their fleets. With the number of new boats already under construction, the over-supply of tonnage will be greatly increased by the end of the year. The problem will be how to find employment for the steamers in existence, without building more. And there is no prospect of the cost of building being reduced any further while the present American demand for crude iron and steel continues. That demand is making pig iron too dear for our manufacturers, who are finding themselves again being undersold by the Germans. Of course that will right itself in time, but until material cheapens there will be no revival in ship building, for there is no prospect of any revival in the freight market. In ship building circles the chief feature of the week has been the placing of a new battleship on the Clyde. There is now a good deal of bustle here in the Canadian trade, with the pressure to get away goods before the closing of the St. Lawrence. The inward boats from Quebec and Montreal are bringing in very large cargoes of produce. The Donaldson liner Concordia is leaving for Sydney, C. B., with a large cargo of building material, and will load homewards at Quebec. The Allan liner Bavarian is resuming her place in the Canadian trade after having been for three years engaged as a government transport in the South African service, in which capacity she has steamed about 140,000 miles.

LAUNCH OF THE CRUISER BERWICK.

The fourth first-class cruiser of the County class built on the Clyde has just been launched by William Beardmore & Co., Govan, and is their first contribution to the navy, although in the same yard their predecessors, Robert Napier & Sons, Ltd., built quite a large number of war vessels for both the British and foreign governments. The last vessel built by the old firm was launched last year, and concluded a list of thirty-four ships of all classes turned out by Robert Napier & Sons, Ltd., for naval purposes. Under Messrs. William Beardmore & Co. the yard has now on hand two contracts for the British government—the Berwick, just launched, and the Carnarvon, a sister vessel, the construction of which was begun recently. The following are the dimensions of the Berwick: Length between perpendiculars, 440 ft.; breadth, molded, 66 ft.; draught, molded, 24 ft. 6 in.; displacement, molded, 9,800 tons; indicated horse power, 22,000; speed, 23 knots; boiler pressure, 300 lbs.; normal coal capacity, 800 tons. The vessel has side protection extending over a length of about 350 ft. from the stem to the armor bulkhead, which is 3 in. thick. The side armor is of specially hardened steel of three thicknesses—4⅛ in., 3 in. and 2 in., the 4⅛-in. armor extending from the armor bulkhead forward for a distance of about 240 ft., and the 3-in. armor for a distance of about 40 ft. Between this and the stem there is 2-in. nickel steel armor. The protective deck proper extends from stem to stern, and ranges in thickness from ¾ in. within the range of side armor to 2 in. outside. This deck is worked at the lower edge of the armor and protects the vitals of the ship. Another deck, 1¼ in. to 1 in. in thickness, forms a crown over the side armor and armor bulkhead, etc. The general construction is similar to that usually adopted in the service, the vessel being extensively sub-divided into numerous water-tight compartments. The coal bunkers range along the sides of the machinery compartments both below and above the lower deck, and are provided with the usual fittings for rapidly handling and distributing the coals. The normal coal capacity is 800 tons, but this can be doubled if necessary.

As an armored vessel the Berwick marks the immense advance made since the famous ironclad Black Prince (now a training ship in Cork harbor) was built by Napiers in the same yard forty years ago. Curiously enough the plates for the Black Prince were rolled by Messrs. William Beardmore at their Parkhead works. The armament of the Berwick will consist of two twin 6-in. guns, one forward and one aft in 4-in. barbettes, ten 6-in. guns in hard steel casemates, ten 12-pounders, three 3-pounder quick-firing guns, eight Maxims, and two submerged tubes for 18-in. Whitehead torpedoes. The propelling machinery consists of two sets of triple-expansion engines in separate water-tight compartments, each set having four cylinders working on four cranks, their diameters being 37 in., 60 in., 69 in., 69 in. respectively, with a stroke of 3 ft. 6 in. There will be an installation of Niclausse boilers for 300 lbs. working pressure. The Berwick when launched had all her armor and casemates complete and the inside of the ship was also in a forward condition. She is one of five ordered in October, 1900, and of four placed on the Clyde she is the second to be launched. Moreover, she is the first war vessel to be built in Scotland by one firm who themselves supplied all requirements—the steel of which the hull was built and also the armor with which it was protected—The armor of the Berwick was manufactured at Parkhead by a process invented and perfected by Mr. Beardmore. It is of interest to note that the Berwick was launched from the same berth as the Black Prince occupied forty years ago, and that there are shipwrights in the yard who worked at both ships.

The American-Hawaiian Steamship Co. has secured an option on land in St. Thomas for the purpose of erecting oil tanks in which to store fuel oil for the use of its steamers. The company is now using oil as fuel on steamers running between San Francisco and Honolulu and is contemplating equipping its steamers on the New York-San Francisco route for burning oil. At present its steamers are sometimes obliged to stop at St. Lucia for coal and they are also obliged to put in at Coronel, Chili, for it. The coal which is to be obtained at Chili and at San Francisco is not of the best quality. With oil-burning apparatus the steamers would not need to touch anywhere for fuel after leaving St. Thomas and could steam through to San Francisco. Cheapness of land and the lower freight rate from the oil fields were the reasons for selecting St. Thomas as a fuel base.

Six-masted schooner building at the yard of Percy & Small, Bath, Me., for J. S. Winslow & Co., Portland, Me., has been named Addie M. Lawrence.

HON. C. A. PARSONS ON THE STEAM TURBINE.

Up-to-date Report of Progress from the Inventor—Position of British Ship Building—English Letter.

London, Sept. 27.—At the meetings of the British Association, which have just concluded, great interest attached to a paper read by the Hon. C. A. Parsons on "Steam Turbines," and the discussion that followed it was certainly animated. The lecturer, in the course of his paper, said that the steam turbine was first used for driving dynamos in 1884, and in 1890 about 360 plants had been set to work, varying in size from 4 H. P. to 120 H. P., the total aggregate at the latter date being about 5,000 H. P. At the present time 800 turbo-plants had been sold, aggregating 200,000 H. P., the largest being 3,000 H. P. On the continent, Brown, Boveri & Co. of Baden, Switzerland, who took up the manufacture in 1900, had sold twenty plants, the largest being of 5,000 H. P. The British Westinghouse Co. had lately contracted with the Metropolitan District Railway Co. for the supply of ten turbo-alternators of 5,000 H. P. each, and several plants of moderate size had been built by the Westinghouse company of Pittsburg. The total of all compound parallel-flow turbines at work and on order for generating electricity amounted to an aggregate of about 300,000 H. P. The steam turbine compared favorably in regard to economy with the ordinary steam engine in the generation of electricity. The steam consumption was generally less, and the running costs, notably the up-keep, expenditure on oil, and the attendance, were also less. There was also generally a saving in first cost of the plant, in the housing and in the foundations. The lowest consumption so far recorded had been 17.31 lbs. of steam per kilo-watt hour, with a 1,000 kilo-watt continuous-current plant; this corresponded to about 10.21 lbs. of steam per indicated horse power per hour. The author anticipated that a still lower steam consumption would be reached in large turbines working with superheated steam and a good vacuum. In regard to the question of durability, he stated that several turbine engines had been tested after being at work for a considerable time, and no increase in steam consumption could be detected. Seven vessels had been fitted with steam turbine machinery. A large yacht so fitted would be completed this autumn, while the destroyer Eden and the third-class cruiser Amethyst would be completed in 1903. Within the last few weeks orders for two turbine cross-channel boats of about 8,000 H. P. had been placed with William Denny & Bros, one of them being for the Dover-Calais service. The total aggregate horse power of the above vessels was 82,900 indicated. Considering the question of fuel economy of marine turbine machinery, the author said that in the Turbinia and the Viper the coal burnt compared favorably at higher powers. At cruising speeds the consumption was not excessive considering the size of the engines in terms of the power developed. In the Velox additional small reciprocating engines had been fitted, which would give a high degree of economy at low speeds, so that a small quantity of coal burnt would be secured both at high and low speeds. The success of the Clyde passenger steamer King Edward led to another somewhat larger vessel, the Queen Alexandra, being built, and she was reported to have given entire satisfaction. The King Edward on one season's work ran ten more miles than a similar paddle-boat of about the same dimensions and speed with a coal consumption of 480 tons less. The author concluded by stating that the adoption of the steam turbine system in vessels of large size, such as Atlantic liners, cruisers and battleships, would be attended with greater proportional advantages than in the case of smaller vessels. The large turbines would be cheaper to build, would be lighter, and would occupy less space in proportion to power. The design of such large turbines presented no difficulties beyond those already surmounted, and the greater size permitted the adoption of important features for the further reduction of coal consumption.

In the discussion that followed, Prof. Hele-Shaw discussed the relative merits of parallel flow and radial flow for turbines, and referred to the courage and perseverence shown by C. A. Parsons in bringing his invention to a successful issue after many years of work, often carried out under most discouraging circumstances. The great majority of engineers, the speaker, he confessed, among the number, did not believe the author of the paper would get an economical result. The mechanical accuracy reached in these machines was also worthy of the greatest admiration. Practical men had said the turbine would not last, owing to wear in its bearings, etc., but experience negatived the assumptions of the practical man. A steam turbine had been tested at Elberfeld in competition with a Corliss engine, a type eminently economical, and the result had shown the turbine to have a considerably higher economy.

The lecturer, in the course of his reply, said that with superheated steam still higher efficiencies would be obtained. The gain due to superheating was equal to about 1 per cent. saving in steam used for every increase of 10° Fahr. in temperature. He had tested as high as 200° superheat with 150 lbs. per square inch pressure, but there was no reason why higher temperatures should not be reached. The reverse turbine had been used for lifts up to 700 ft. head in New South Wales, working with the pumps in series on the same shaft. The efficiency of propellers was a difficult subject. In the Turbinia he made certain assumptions and concluded that the efficiency of the propellers alone was about 65 per cent. and that the augmented resistance of the shafts and under-water fittings was about 10 per cent. The velocity of the tips of the blades in the Queen Alexandra was not greater than in third-class cruisers. The reversing of the motion of the vessel had to be done by a separate turbine, the blades being run *in vacuo* when not in use, so as to decrease resistance. Tests had been made with a steam turbine and a Sulzer engine. At three-quarters load the two were equal in economy. Above three-quarters load the turbine had the advantage; below that the reciprocating engine was best. But the turbine required less oil, the saving amounting in value to about 16 per cent. of the cost of the steam. In the Newcastle central station £5 a week was saved in oil as compared to the amount that would be required in ordinary engines.

POSITION OF BRITISH SHIP BUILDING.

I have already indicated clearly enough that the shipbuilding industry in this country is on a temporary decline. It is recognized that the outlook for next year is far from rosy. It is difficult without being diffuse, to state the reasons for this. Doubtless it has a great deal to do with the prevailing activity in the iron and steel trades, due to the exceptional and altogether abnormal demands for British pig iron and steel in America. The American buyers, by keeping up the prices both of crude iron and finished material, are largely responsible for the absence of new orders for new vessels, particularly tramps. Prices were cheapening in the early summer, but they have stiffened again, and now the tramp owner does not care to invest. The freight markets, too, remain exceedingly depressed. I have already given particulars of ships delivered to foreign countries during the past two months, and perhaps it would be interesting to mention two or three of the large ships delivered to English buyers. A cargo steamer of 7,500 tons, built by Connell & Co. for T. & I. Harrison of Liverpool; a steamer of 4,500 tons, built by Beardmore & Co. for the Eastern & Australian Steamship Co.; a steamer of 4,400 tons built by Denny & Co. for the Union Steamship Co. of New Zealand; a steamer of 4,000 tons, built by Russell & Co. for Larrinaga & Co. of Liverpool, whose operations in southern American ports are well known. All these were in July. In August a twin-screw of 9,000 tons, built by D & W. Henderson & Co. for the Holt Line of Liverpool, also well known for their American connections; a steamer of 6,500 tons, built by Barclay, Curle & Co. for the Blue Anchor Line; a steamer of 3,550 tons by the Fairfield Co. for the Pacific Steam Navigation Co.; a steamer of 5,100 tons by Alexander Stephen & Sons, for the Anchor Line. Another steamer of 1,400 tons, by Russell & Co. for Larrinaga & Co. of Liverpool.

The new Cunard liner Carpathia is nearing completion. The insurances upon her while under construction, amount to nearly £300,000 and she has been covered until her delivery in Liverpool. Another boat upon which the builders are busy is the battleship Edward VII. in the dock yard of Harland & Wolff. The builders' risks are insured for £197,000. The business was done on terms favorable to the contractors. The risks covered are those of damage or loss during construction, transit of the machinery in steamers to Devonport, the fitting in the royal dock yard there and damage during trial trips. In view of a recent case in the courts it may be mentioned that while damage due to "latent" defects is covered, the insurance does not protect the contractors from the results of improper workmanship or material or of negligence on their part.

HIGH INSURANCE RATES ON ST. LAWRENCE.

A few weeks ago I referred to the high insurance rates on the shipping trade in the St. Lawrence river and gave particulars of wrecks in that treacherous quarter over a period of three years. Sir Alfred L. Jones, on behalf of the Elder, Dempster Co., on Aug. 29 wrote a letter to the minister of marine of Canada, in which he makes complaint against these high insurance rates. He says: "The underwriters say that we are in more risky navigation than the northern ports of the United States; but it is a fact, nevertheless, that we have completed during the last three years eighty voyages from Canada without a mishap. We are therefore indignant that our ships should be charged such high rates compared with those of steamship lines to American ports." As soon as I saw this, I felt sure that somebody from Lloyd's would respond with a crushing answer. And I was right. The answer I expected is as follows, and is a criticism upon the words quoted above:

"This passage, as it stands, can hardly fail to convey a wrong impression in Canada; since it would appear that Sir Alfred Jones, while calling attention to Elder, Dempster's successful voyages, has omitted altogether the unsuccessful ones. In justice to the underwriters, who are singled out for blame, I may point out that during the three seasons to which Sir Alfred Jones confines his figures, three of Elder, Dempster's steamers have grounded in the St. Lawrence and have been got off badly damaged, and two others, while on voyages to Montreal, have been totally wrecked on the coast of Newfoundland. Sir. A. Jones might, perhaps, claim that the last two wrecks have nothing to do with the St. Lawrence; but underwriters have to take the dangerous Newfoundland coast into their reckoning when fixing rates for vessels trading with the St. Lawrence ports. The three casualties which occurred in the St. Lawrence and its approaches were as follows: Ashanti, 3,389 tons, Tyne to Quebec, grounded near Matane, St. Lawrence, in April, 1901; Montfort, 7,101 tons, Montreal to Bristol, grounded between Montreal and Quebec in October, 1901; Monteagle, 5,498 tons, Avonmouth to Montreal grounded at Fame Pont in July, 1902. The Newfoundland total

wrecks were: Montpelier, 3,483 tons, Las Palmas to Montreal, wrecked on Duck island in May, 1900, and Lusitania, 3,912 tons. Liverpool to Montreal, wrecked on Cape Ballard in June, 1901."

OBSERVATIONS ON A SUBMARINE.

I hear that a series of experiments is taking place at Brest, with a new apparatus for taking observations on board a submarine, when totally immersed. It is claimed by the inventor that this apparatus will avoid the necessity for submarines to come to the surface. It is designed on magnetic principles. Nobody knows yet, however, whether the experiments have been successful. The sighting apparatus supplied to the five British submarines is considered to be superior to the French periscope. Something, however, must be done to perfect this particular department, as it is obvious that a submarine must be able to see ahead while remaining below water. The necessity which exists for the vessel to come to the surface constitutes now the greatest danger that menaces this class of warship.

The admiralty are so satisfied with the experiments made with the submarines built at Barrow that they have determined further to strengthen their flotilla of the Holland type of boat, for which Vickers, Sons & Maxim hold the British rights and patents. Further experimental work will, however, be necessary with these submarines before the admiralty adopt a big building program, but they are proceeding with caution and are adopting all improvements which science and experience suggest in order to make these new fighting machines thoroughly effective for the purpose in view. Two submarines are now ready for delivering to the admiralty, to supplement the two already at Portsmouth.

ENGINES OF THE KAISER WILHELM II.

We present herewith, reproduced from Engineering, a photograph of two sets of the main engines as coupled to one of the two shafts of the twin-screw steamship Kaiser Wilhelm II. of the North German Lloyd Line. In order to keep the watertight compartments, utilized for accommodating the machinery, as short as possible, for the greater safety of the vessel in case of collision and fracture of the skin plating of the vessel in their neighborhood, it was decided to divide the machinery into four sets, and to place each in separate rooms formed by transverse and longitudinal bulkheads. This necessitated a particular construction of the engines and the arrangement is such that in each room there is fitted a self-contained four-cylinder quadruple engine working on three cranks. The construction of each double set, which is balanced on the Schlick system, is clearly shown in the engraving on the opposite page. The high-pressure cylinder is placed above the first intermediate, the arrangement resembling the Wolff system. Next to the first intermediate comes the second intermediate, and next the low-pressure cylinder. But for balancing purposes the double set is arranged so that the two tandem cylinders adjoin each other, although with the bulkhead between. Each high-pressure cylinder is provided with a second stop-valve, in addition to the main stop-valve. The levers for working the auxiliary valves and the reversing engines are so arranged that the two engines on each shaft can be worked from either of the two engine rooms; but when the engines are working under normal conditions the engineer's platform will be in the forward engine room. Should the forward engine room be filled with water through misadventure, it is possible to drive the after engine separately and the same can be done with the forward engine in case of the after engine being out of order. The principal dimensions of the main engines are: Diameter of high-pressure cylinder, 37.4 in.; first intermediate, 49.2 in.; second intermediate, 74.8 in.; low-pressure, 112.2; common stroke, 70.8 in. The boiler installation consists of twelve double-ended and seven single-ended boilers. The arrangement of these boilers is as follows: Starting aft in the first boiler room there are three double-ended boilers; in the second boiler room, three double-ended and three single-ended boilers; in the third room three double-ended and three single-ended boilers; while in the forward boiler room there are three double-ended and one single-ended boiler. This distribution is adopted in order to facilitate the transport of coal to the boilers.

French naval authorities are beginning to devote great attention to the rapidity with which new ships can be built in the government yards, for it is found that the time required for building armored cruisers and battleships in Great Britain is nearly 20 per cent. less than in France. The battleship Republique, the largest vessel ever constructed for the French navy, which was launched on Sept. 4 at Brest, was built more rapidly than any vessel of her class vet constructed in France. The Republique was ordered on June 28, 1901. The keel was laid on Dec. 2, 1901, and she was launched on Sept. 4, 1902, or upon the thirty-second birthday of the third republic. The Republique has a displacement of 14,800 tons and is the first of a new type of six vessels which have been ordered by the French ministry of marine. She is said to resemble the new type adopted for the United States navy, of which the Connecticut and Louisiana are the first examples. Forty-two months, however, are allowed for the construction of the Louisiana. The present naval program will give France a navy of twenty-eight battleships, fourteen coast-defence battleships, twenty-four armored cruisers, thirty-five protected cruisers, seventy-two destroyers, sixty-eight submarines and 210 torpedo boats.

TURBINE-DRIVEN VELOX.

When the British torpedo boat destroyer Viper went ashore off Renonquet rock near Alderney in a fog and was totally wrecked a year ago the critics were loud in their condemnation of turbine-driven craft. A month later the Cobra, a sister vessel, foundered in the North sea, and out of seventy-nine persons aboard only thirteen escaped. The remarkable speed of the turbine-driven vessels had attracted the attention of the whole world and their untimely loss left the question of the steam turbine as a means of propulsion for naval craft still undetermined. Now it is to have a further test. The Parsons company has built the Velox, outwardly a substantial duplicate of the Viper, and she is now the property of the British government. The Velox is promised a performance equal at full speed to that of her unfortunate pioneers and also the assurance of economical running at moderate speed. This is accomplished by a combination of steam turbines and small auxiliary engines of the ordinary triple-expansion type. The steam turbine, like the electrically-driven motor, can be run most economically at full speed, intermediate rates of running resulting in loss of driving power in ratio to steam or electricity used.

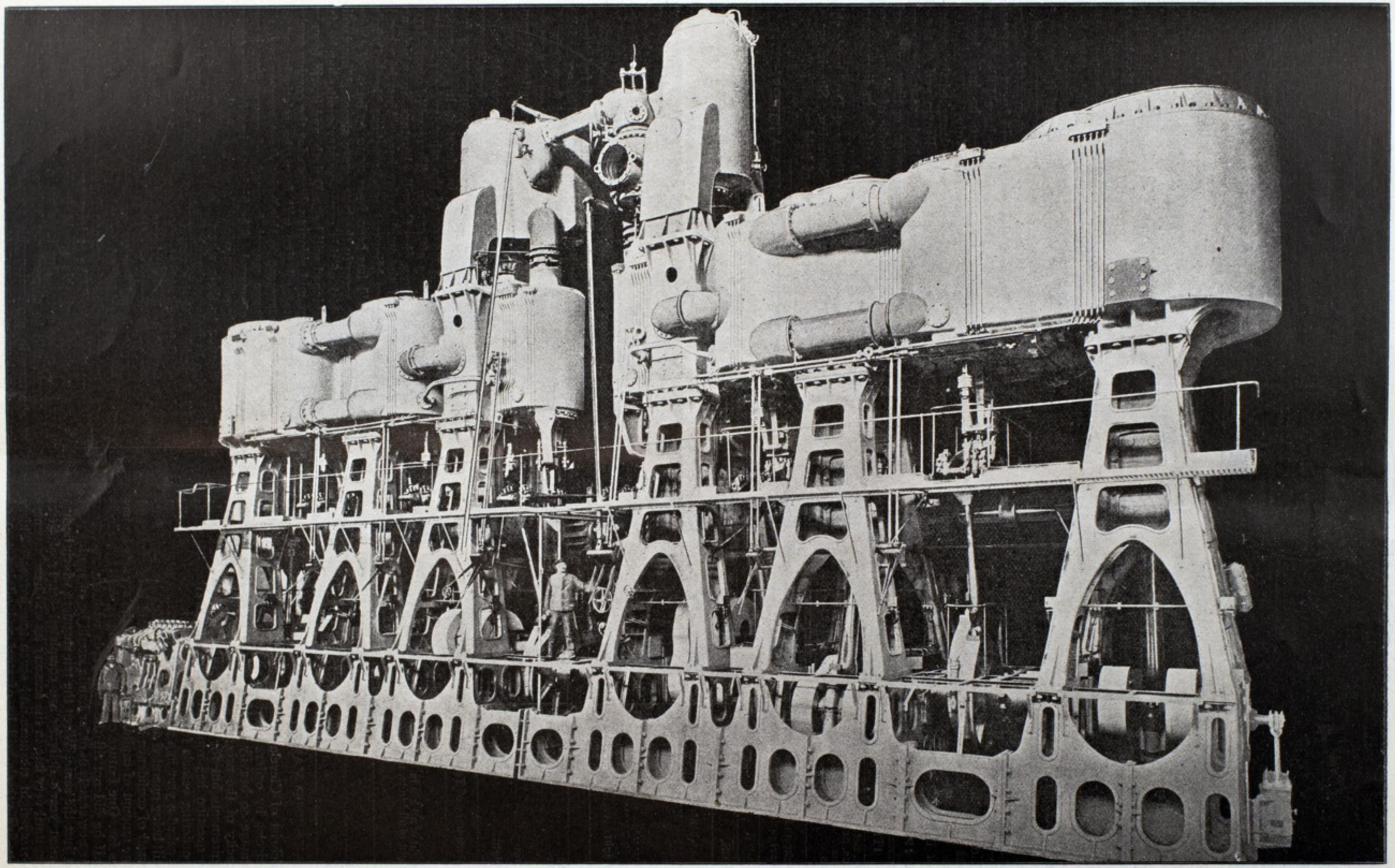
Now, everybody knows that a warship, unlike a merchant craft running upon a regular route, must frequently vary her speed, and seldom in peace time is she called upon to make her maximum speed for any lengthened period. The turbine, therefore, is not primarily fitted for naval craft, because it must either be run at very low speed or the very highest speed. But Mr. Parsons has undertaken to meet these objections and the forthcoming trials of the Velox are awaited with keen interest by the engineering world. If he succeeds in his present endeavor he will not only establish firmly a place for the steam turbine in the engine room of a large share of the world's warships, but he will have gone a long way toward solving the vexed question of economy of coal consumption at all running rates.

It isn't necessary to live in the midst of a time of coal strikes to appreciate the value of that fuel, for the pound saved on shipboard mean not only money saved to the people running the vessel, but the lessened demands for fuel space means more room for cargo of one sort or another, and on a naval craft that much less deadweight to be driven through the water. Only one familiar with the scheming of the naval architect and the marine engineer realizes how jealously he apportions every pound in the vessel's get-up and with what discouragement he views the slightest increase of weight.

From the popular descriptions given of the Turbinia when she was first built the public has a fair understanding of what the steam turbine means. It is an adaptation of the modern windmill in principle, but there the likeness ceases. Where the farmer's helper has a dozen blades, the turbine has several thousand. In the turbine there are none of the familiar piston rods, shifting valve gears, revolving cranks, sliding parts and balance wheels. The propeller shafts become the balance wheels, the casings of the turbines become the cylinders and the thousands of little blades studding the shaft collars become the pistons. These blades stud the collars as thickly as porcupine quills and are turned at just the proper angle to receive the maximum impulse of the entering steam, which passes spirally from one end of the casing holding the turbine to the other. The steam, still full of life, then passes into another, or low-pressure, casing, where it finally expends itself before going on to the condenser, to be turned again into water for use in the boilers.

In the ordinary engine steam is exhausted at a pressure of 7 or 8 lbs., which means 7 or 8 lbs. of propulsive force sent wastefully into the condenser. With the turbine, steam is ultimately exhausted with the pressure of 1 lb. absolute—meaning a saving in coal, for coal means steam. The simplicity of the turbine removes many of the dangers present in fast moving reciprocating engines; breakdowns are few and far between; and the engines themselves require less attention. Compared with the usual type of torpedo boat destroyers' engines, the turbines for the same power are 30 per cent. lighter, and while occupying about the same floor space, do not demand the same head room—thus permitting the machinery to lie lower in the boat, something that adds not only to the stability of the craft, but keeps the motive power much better hidden from an enemy's shot.

The Velox is 210 ft. long and has a maximum beam of 21 ft. Special attention has been given to the feature of longitudinal strength. She will have two high-pressure and two low-pressure turbines—the high-pressure turbines will drive the two outer shafts, and the two low-pressure turbines will turn the two inner shafts. Each shaft will carry two propellers, one forward of the other. Here comes the novel feature. There will be two triple-expansion engines of moderate power which are coupled by the two high-pressure turbines. When running at cruising speeds, steam will be fed directly from the boilers to these engines, which, in turn, will exhaust into the turbines, where the remaining power of the steam will be fully utilized. When it is desired to make the 30 odd knots of which the Velox will be capable steam is fed directly from the boilers to the high-pressure turbines and the auxiliary engines are disconnected, for it would not be safe to have them working at anything like the number of revolutions thoroughly possible and safe for the turbines; in fact, a reciprocating engine would be racked to pieces long before it attained such velocity.



Two of the four sets of quadruple-expansion engines of the North German Lloyd Steamship Co.'s new steamer Kaiser Wilhelm II; total horse power, 40,000.

[Built by the Vulcan Ship Building Co., Stettin.

NEWS OF THE GREAT LAKES

PROBABLY THIRTY-FIVE MILLIONS.

It is Expected that that Number of tons of Freight will be Moved to and from Lake Superior in the Present Season.

A total movement of 35,000,000 tons of freight to and from Lake Superior through canals at the Sault is looked for with the close of the present season of navigation; this as against 28,000,000 tons a year ago, 8,800,000 tons ten years ago and only 1,500,000 tons twenty years ago. Reports from government officials in charge of the canals show a total movement of 26,312,922 tons to Oct. 1 of this year, as against 20,369,065 tons on Oct. 1 a year ago and 19,901,473 tons Oct. 1, 1900. Coal is the only important item in which a decrease is shown. The hard coal movement to Lake Superior is confined to the few cargoes shipped before the strike—little more than 100,000 tons in all. Soft coal shipments to Oct. 1 foot up 3,455,608 tons, as against 2,896,483 tons on the same date a year ago and 3,178,113 tons Oct. 1, 1900. A detailed summary of the traffic to Oct. 1 of each year for three years past follows:

Movement of Principal Items of Freight to and From Lake Superior.

ITEMS.	To Oct. 1, 1902.	To Oct. 1, 1901.	To Oct. 1, 1900.
Coal, anthracite, net tons	114,188	529,788	422,375
Coal, bituminous, net tons	3,455,608	2,896,483	3,178,113
Iron ore, net tons	18,536,170	13,583,867	13,102,470
Wheat, bushels	40,444,267	23,663,694	31,294,217
Flour, barrels	5,887,591	4,986,228	4,341,946

Report of Freight and Pas enger Traffic to and From Lake Superior, From Opening of Navigation to October 1, of Each Year for Three Years Past.

EAST BOUND.

ITEMS.	Designation.	To Oct. 1, 1902.	To Oct. 1, 1901.	To Oct. 1, 1900.
Copper	Net tons	85,060	61,893	95,518
Grain, other than wheat	Bushels	6,616,911	9,859,324	7,421,640
Building Stone	Net tons	30,332	32,709	26,759
Flour	Barrels	5,887,456	4,985,883	4,341,734
Iron ore	Net tons	18,536,170	13,583,867	13,102,470
Iron, pig	Net tons	11,878	22,746	15,069
Lumber	M. ft. b. m.	834,216	771,577	624,645
Silver ore	Net tons	1	.....	110
Wheat	Bushels	40,444,267	23,663,694	31,294,217
Unclassified freight	Net tons	91,852	43,629	49,725
Passengers	Number	26,796	24,387	25,778

WEST BOUND.

Coal, anthracite	Net tons	114,188	529,788	422,375
Coal bituminous	Net tons	3,455,608	2,896,483	3,178,113
Flour	Barrels	135	345	212
Grain	Bushels	13,627	56,430	21,984
Manufactured iron	Net tons	122,720	90,244	94,317
Salt	Barrels	326,339	347,017	200,456
Unclassified freight	Net tons	425,378	334,780	294,079
Passengers	Number	26,187	26,329	26,445

Summary of Total Freight Movement in Tons.

	To Oct, 1, 1902.	To Oct. 1, 1901.	To Oct. 1, 1900.
West bound freight of all kinds, net tons	4,166,078	3,904,553	4,020,388
East bound freight of all kinds, net tons	22,146,844	16,464,512	15,881,085
	26,312,922	20,369,065	19,901,473

	Vessel passages.	Registered tons.
To Oct. 1, 1902	17,164	23,473,501
To Oct. 1, 1901	14,561	17,706,056
To Oct. 1, 1900	14,919	17,366,783

LAKE SHIP YARDS FILLED FOR 1903.

J. C. Gilchrist of Cleveland has again caused quite a stir in lake vessel circles by orders for new ships. Why is he going into new tonnage so heavily at high prices when it is evident that the capacity of the present lake fleet would be more than equal to requirements but for the congestion of docks and railways? This question has repeatedly been asked since Mr. Gilchrist began ordering vessels for next year's delivery. The same question was asked a year ago and two years ago, but the modern vessels are still being operated at a profit. Mr. Gilchrist is evidently still possessed of confidence in the business and is in command of a very large amount of capital as a result of the success he has met with thus far. One feature of his reasoning is evidently along the line that if he did not fill the ship yards with orders others would, and the new vessels in other hands would be competing with his large fleet just the same. When the ten steamers which he has ordered for next year's delivery are completed (some of them will not be out until very late in the season) he will have seventy-five vessels—sixty-eight steamers and seven tow barges. Thirty of the seventy-five vessels will be of steel and all but two of these steel vessels will be steamers, most of them of 5,000 to 6,000 gross tons capacity. Announcement was made several days ago regarding the order to the American Ship Building Co. for six of the ten steamers here referred to. The four additional orders were placed within the past week—two to the Columbia Iron Works of Port Huron, which has just erected new works on the St Clair river, and two to the American Ship Building Co. These two latest orders to the American Ship Building Co. practically put that company out of the market for new vessels for next year. Their yards are all filled and the aggregate value of some thirty-seven or thirty-eight orders which they have booked is about $8,800,000. All of the ten Gilchrist vessels are to be duplicates. They will be 436 ft. over all, 416 ft. keel, 50 ft. beam and 28 ft. deep. They will have triple-expansion engines with cylinders 22, 35, and 58 in. diameter and 40-in. stroke. Steam will be furnished by Scotch boilers, which will be 13 ft 2 in. in diameter and 11½ ft. long. They are all to have Ellis & Eaves draft. It is expected that two steamers to be built by the Columbia Iron Works will come out next July.

The Jenks Ship Building Co. last week launched the steamer John B. Cowle building for Capt. W. W. Brown and others of Cleveland. She is 440 ft. long, 420-ft. keel, 50-ft. beam and 28 ft deep. She will have triple-expansion engines with cylinders of 28, 38, and 63 in. diameter and stroke of 40 in. Steam will be furnished by three Scotch boilers, 12½ ft. in diameter and 12 ft. long. Capt. Bush Jones will sail her.

The wooden schooner Chieftain, building at Davidson's ship yard, Bay City, will be launched on Saturday. She is 353 ft. in length, 45 ft. beam and 26 ft. depth of hold.

NORTHWESTERN GRAIN MATTERS.

Duluth, Oct. 6.—It is a cause for considerable surprise that, in spite of the late beginning of shipments to Lake Superior terminals, there should have been received at Duluth and Superior so much grain as there has. Last year there were received at these points, from Aug. 1 to Oct. 5 14,910,497 bu. wheat and 1,143,418 bu. flax. This year to the same time the receipts were 11,003,434 and 2,305,402 bu. respectively a difference in favor of last year of about 2,750,000 bu. Shipments this year on the new crop have been 750,000 bu. more than for the corresponding time last season. Wheat is now going forward from the head of the lakes faster than it is coming in, and there was a reduction of the stock held here this week of 19,278 bu. Vessel freights are active and strong as a result but not changed. The port of Superior last month handled freight to the value of $9,517,000. In the same time the port business of Duluth was about $12,000,000, making for the head of the lakes a combined valuation of some $21,000,000.

There is a tremendous amount of barley coming to the head of the lakes this fall. Expectations are for from 8,000,000 to 10,000,000 bu. here on the crop, and it is coming very fast. Now there is nearly as much barley in elevators here as wheat. 1,400,000 bu of one and 1,210,000 of the other, and the increase of barley for the week was 468,000 bu. There will be very large shipments this week from the Cargill elevators, in which are stored about 800,000 of the total barley here. Most of what is coming is from northern Minnesota and northern North Dakota, where the average yield has been from 35 to 40 bu. to the acre, with probably 500,000 acres in the latter state alone. Minneapolis is drawing a good deal of this upper-country grain, but by far the bulk of what is shipped will be to Duluth, and it will form no small item in elevator and shipping figures for the coming twelve months. Barley, oats and flax will form the relatively greater part of the crop movement to this point from now on, not the actually greater tonnage moved forward, of course, but larger when the crops are compared. The higher prices for these grains will urge interior elevator men and farmers to push them and to give less attention to their wheat.

It begins to look as though lumber shipments from the head of Lake Superior will this year fall off materially from the past year or two. It is probable that the total cut of deep-water mills at Duluth and Superior will be 75,000,000 ft. less than last year, or not in excess of 350,000,000 ft. for the year. There are now about 100,000,000 ft. of lumber on docks at Duluth, of which about a quarter is sold, and to this will be added before the close of the year some 60,000,000 ft. more. At the usual rate of shipment there should be at least 125,000,000 ft. sent forward before the close, and this would leave a very small quantity on hand to carry over. But it is not probable that more than 75,000,000 ft. will be shipped out before the close of navigation. The shortage in production this year is due in part to a bad winter for logging, in part to the fact that logs cannot be brought down on the iron ore roads during their busy summer season, and in part to a shortage of timber among some of the

milling firms that have not maintained their standing timber of late years. The probabilities are that the cut of the coming year will be as large as ever, or nearly so. A large amount of timber that would naturally come to Duluth for sawing will not do so, having been bought by firms that saw for the all-rail western and southwestern markets. The development of this branch of the Minnesota timber trade has been remarkable during the past year or two, cutting out an immense amount of lumber that would otherwise take the lake route easterly.

Barnett & Record, contractors on the new fireproof grain storage at Port Arthur, Lake Superior, have completed the foundations for eighteen of the tile tanks they are to construct and have begun the superstructure. These eighteen will be built this year, the others next spring. The storage when completed will hold about 2,200,000 bu. wheat, and should all be in readiness for the present crop. The contractors are having some trouble with men and are importing masons from the United States, having received special permission so to do from the Canadian government. This elevator is for the new Canadian Northern road. Those to be built for the Canadian Pacific road are not so far along and can scarcely be ready for the crop of 1903.

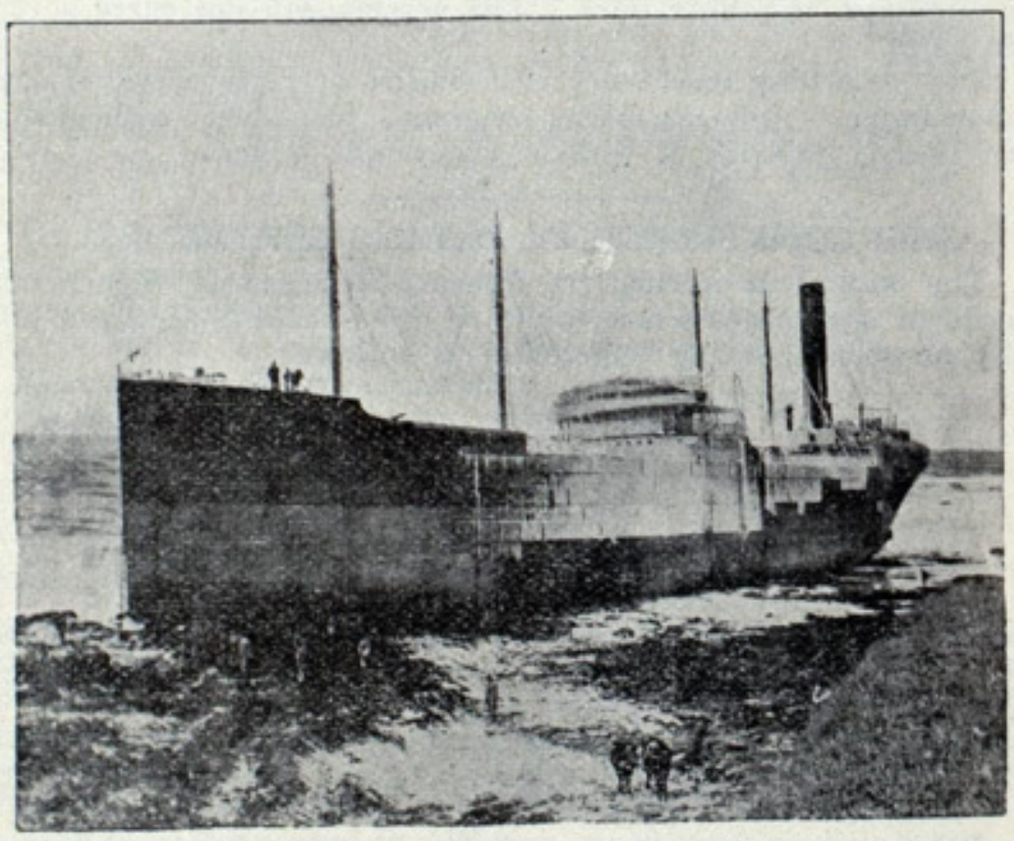
Hugo & Tims of Duluth have bought the sunken scow Keyes, that lies near Ontonagon, where she sunk last fall, paying $1,500 for her. They will raise the boat at once and use her in their contract work at Presque Isle, Marquette. Whitney Bros. of Superior, have the raising job.

The city of Superior has turned down the proposition for a city dock, as foreshadowed last week.

The tug Tom Dowling has been sold by J. C. Howard of this city to the Independent Tug Line for $2,000. The Howard tugs will all be in the independent line, in which the Howards are interested.

A SUCCESSFUL WRECKING JOB.

James Reid of Sarnia, Ont., well known in the great lakes region on account of several large salvage undertakings with which he has been connected, notably the Lehigh Valley Line steamer Cayuga, sunk in the Straits of Mackinaw a few years ago, recently succeeded in releasing from Chebogue point, near Yarmouth, Nova Scotia, a large steel freighter, the Mira, which was stranded there in February last. A picture of the vessel as she appeared when ashore is presented herewith. Capt. Reid will get $50,000 for the job and there is a very large profit in it for him, as the task was not especially difficult. He may realize even more than $50,000 out of the undertaking, as he will probably buy the ship on account of conditions attending the salvage contract. Capt. Reid was induced to bid on the job through Mr. E. Parry-Jones of Cleveland, who has been representing English underwriters in this country for some time past and



The Stranded Steamer Mira.

who met Capt. Reid in connection with other salvage work on the lakes. In order that the ship would not be unnecessarily injured in the work of releasing her, the underwriters' contract with Capt. Reid provided that he was to be paid $50,000 or one-half of the net proceeds from the sale of the vessel when released, as they (the underwriters) might elect. It turns out that the vessel will sell for more than $100,000, so that Capt. Reid will be paid the fixed figure, $50,000. He is, however, figuring on buying the ship from the underwriters, and in view of his relations towards them in releasing her can probably buy to better advantage than an outsider and thus further increase his profits. Court proceedings in Detroit, in which Edmund Hall, retired lumberman, seeks to recover money advanced to Capt. Reid while he was working on the sunken Cayuga in the Straits of Mackinaw are probably prompted by the knowledge that there will be a large profit in the Nova Scotia job.

The Mira is a steel steamer of 350 by 46 by 30 ft.; gross tonnage, 3,779; capacity on a mean load draught of 23½ ft., 6,000 tons. She rated 100 A1 at Lloyd's and was valued at about $275,000. The underwriters paid $250,000 insurance on her. At the time of the accident she was under charter to the Dominion & Atlantic Coal Co. but was owned in London. She was bound from Boston to Louisburg, Cape Breton, with a very light load of timber and machinery, when she went ashore Feb. 3 on the point of rocks near Yarmouth.

It was found when preparations were made to begin operations on the stranded vessel that not only had the rudder frame, rudder, and propeller blades been carried away, but the outer bottom was badly damaged. All the seams and butts in way of the double bottom, both inside and out, were so severely strained that numerous rivets fell out. There being large rocks abreast the ship fore and aft, on the off-shore side, and the ship working badly as she lay, Capt. Reid adopted the plan of digging a trench 400 ft. long, 60 ft, broad and 4 ft. deep on the inshore side of the ship, and clearing away large ledges of rocks aft of the trench, then pushing the ship into this basin and floating her out stern first. About the first of May he commenced to blast out with dynamite the slaty rock, which runs in vertical strata at this point, and, at the same time, with the use of an air compressor, calked the leaky seams and made temporary repairs along the outer and inner bottoms. The ship was kept steady at high water by building stone cribs under her bilges and allowing the water to rise inside of the hull. The trench being completed, steel wire ropes attached to rocks in-shore were led to the winches on board, and four 100-ton hydraulic jacks were placed against the hull on the off-shore side. By these means she was hauled, on July 31, into the trench. Braced wooden shores were substituted for the three stone cribs, and three extra pumps were put on board to be used with the ship's pumps in clearing the hold. When all was in readiness, with the aid of a large tug, Capt. Reid made an attempt to get her afloat in a thick fog on Aug. 2, but only succeeded in pulling her astern about 60 ft. and her stern out from the shore 30 ft., when she fouled the rock at the outside of the trench. This rock was cleared away. Then one end of the steel wire hawser was made fast to a rock 100 yards right aft on the in-shore side, and the other attached to a fall leading to one of the ship's steam winches. The starboard anchor was placed on the off-shore or starboard side, amidships, in a hole dug in the rocks to receive the flukes, and had a pull from the windlass. With the aid of the tug another attempt to float the ship was made the next night, but was unsuccessful. More rock had to be blasted away from under her after bilges. It being noticed that she had a list to port during these trials, the cast-steel rudder post and rudder were picked up and placed on the starboard side, and the large hole in the bottom was stopped up with a cotton and canvas mat. The last and successful attempt was made on Aug 26. On this occasion the starboard anchor was taken 600 ft off-shore amidships. With the assistance of two small tugs the vessel's stern was pulled out, pivoting about her stern frame until she was at right angles with the shore line, when she slid off entirely.

THE COAL CONFERENCE.

The feature of the week has been the somewhat spectacular attempt of the president to settle the coal strike. His conference did not settle the coal strike but merely furnished another evidence of that strange impetuosity which makes the president one of the most unplaceable of men. He spoke of it as a personal effort but it is impossible for the president to disassociate himself from his office. The effect of the conference was wholly bad as the humanitarian motives of the president were wholly good. The president is justified in interfering in the coal strike on one ground only—and that the enforcement of law and order. His duty was clearly to call the governor of Pennsylvania to Washington and not the coal operators. He should have asked the governor whether he was capable of maintaining the security of life and property in Pennsylvania and, if not, he should have exercised the greater power of federal authority. Mr. Cleveland did not call the railway presidents to Washington to settle the Chicago strike. He caused the arm of federal authority to embrace the state of Illinois as soon as it became clear that the machinery of the state was helpless or inoperative. This, and the Venezuelean affair, were Cleveland's master-strokes, and it does not appear that he erred in either. The president might have foreseen that the coal conference could have had no outcome other than what it did. Humanitarianism was not alone the issue. There were certain grave questions, such as the right to labor unmolested, the right to walk along the street without being stoned and the right of private property. We regret that the president should have stepped beyond his proper province. For the present he is the president of the United States first of all, charged with the enforcement of law and the maintenance of justice.

A four-masted wooden schooner, the Edgar W. Murdock, was launched from the yard of Carleton, Norwood & Co., Rockport, Me., last week. She is intended to be used by the ship building company. Her dimensions are: Length over all, 240 ft.; keel, 205 ft.; beam, 42.8 ft; depth, 24 ft. She will be commanded by Capt. Frank Magune of Rockport, Me.

AROUND THE GREAT LAKES.

Capt. A. J. Cowley has been compelled to give up command of his steamer the W. H. Gilbert, on account of illness.

The first wheat cargo of the steamer Turret Chief from Fort William to Midland, Ont, amounted to 105,094 bu., or a trifle over 3,000 net tons.

The river below the Lake Shore bridge at Cleveland is to be dredged to a depth of 25 ft. which will be the first instance of its kind along the chain of great lakes L. P. & J. A. Smith have secured the contract.

The Western Transit line steamer Rome will be in dry dock six weeks as a result of the injuries received in striking North point while endeavoring to enter Milwaukee harbor. Over 100 ft. of her keel will have to be replaced.

The steel freighter Tadenac, building for the St. Lawrence & Chicago Navigation Co., was launched at Bertram's ship yard, Toronto, last Saturday. She is of canal size, measuring 257 ft. over all, 43-ft. beam and 25 ft. 6 in. deep.

A new boat for the Ohio Fish and Game Commission, the Oliver Hazen Perry, which has been building at the McKinnon Iron Works, Ashtabula, was turned over to the state last week. She will be commanded by Capt. Thorne of Cleveland.

Capt William Langell of St. Clair, mate on the Calumet Transit Co.'s steamer George A. Flagg since that vessel came out a couple of seasons ago, has been appointed master of the steamer R. S. Warner of the same fleet, to succeed Capt. Martin Johnson, who died a few days ago.

The White Star Line of Detroit has bought the passenger steamer Pennsylvania, which was built a few years ago for service between Erie and Buffalo and which is a very fast screw steamer of 218 ft. length. She will be operated next season between Toledo, Detroit and Port Huron.

A lighthouse has been erected by the government of Canada on the southeastern extremity of Littel Gros cap, entrance to Michipicoten harbor. The light will be fixed white, elevated 70 ft. above the water level of the lake and should be visible 14 miles from all points of approach by water but will not be visible from the wharves in the harbor.

Capt. Claus Reese, a native of Heligoland, who sailed the seas and great lakes in early manhood, died at the home of a daughter in Cleveland a few days ago. A notable voyage on the part of Capt. Reese when a young man was the taking of a cargo of black walnut from Toledo to Hamburg, Germany, to be used for gunstocks for the German government.

Officials of the Lumber Carriers' Association who met in Detroit Tuesday, say that they now have on their books 365 out of a possible 380 lumber carriers on the lakes and say their position was never stronger or the outlook for maintenance of the association brighter than at the present time. They decided that the rate of $2 50 from head of the lakes will not be changed this season.

Capt. Dan. Bule of the steamer Hiawatha states that no fog existed when his vessel ran upon the reef off the north point of Thunder bay, Lake Huron. The night was very dark. however, with a northwest wind blowing with such force that he deemed it advisable to seek shelter. He was trying to locate the gas buoy on the reef when he brought up. He claims that the buoy was not lighted.

L. T. Brogan who has for more than twenty years been connected with the operation of harbor tugs in Cleveland, has resigned his position as local manager with the Great Lakes Towing Co. and has been succeeded by Capt. Philip Broderick, "Lee" Brogan, as he was familiarly called, was probably better known to the men aboard vessels than anyone connected with harbor towing. He is still a young man, notwithstanding his long service on the river at Cleveland. Capt. Broderick has commanded the steamer City of Venice, the Robert Mills and other vessels.

A survey of the shoal at Sarnia, St. Clair river, has been made by the government officials, which shows the upper end of the shoal, with 18 to 19 ft. of water at the present stage, to be 950 ft. above the gas buoy on range of the Howard chimney and custom house at Port Huron. The 20 ft. depth on the east edge of the shoal is about 600 ft. eastward of the gas buoy. Capt. George P. McKay, chairman of the Lake Carriers committee on aids to navigation, has requested the inspection of the eleventh lighthouse district to move the gas buoy 600 ft. to the eastward until such time as the shoal can be removed.

The Pittsburg Steamship Co. has filed in the United States district court its claim, exceptions and answer to the libel and petition of William P. Rend, owner of the steamer Hadley, for limitation of its liability. The steamer Thomas Wilson, owned by the Pittsburg Steamship Co., was sunk in a collision with the Hadley off the harbor entrance of Duluth last June. In its answer the Pittsburg company claims that the Hadley and its officers were at fault in that the steamer had no proper lookout, that those in charge of her were inattentive to their duties and that while meeting the steamer Wilson port to port she changed her course to port and crossed the bows of the Wilson. The Pittsburg company claims a total loss of $160,000.

BIDS FOR BATTLESHIP LOUISIANA.

Bids for the construction of the biggest battleship ever projected by the United States navy, the Louisiana, were opened a few days ago by the navy department. Five ship building firms entered the competition. On the face of the bids the lowest submitted was that of the Newport News Ship Building & Dry Dock Co. of Newport News, Va. The Union Iron Works of San Francisco, while it submitted a bid of $160,000 higher in figures than the price named by the Virginia concern, actually had the advantage of the competition, as Pacific coast builders are allowed an additional 4 per cent. on the amount of the contract to cover the extra cost of transporting materials to the ship yard. Thus while the bid of the Union Iron Works was $4,150,000, actually for the purposes of competition with other builders, it was constructively 4 per cent. less, or $3,984,000. The bid of the Newport News Co. was $3,990,000, or $6,000 more than the reduce bid of the Union Iron Works. The other bidders were: New York Ship Building Co., Camden, N. J., $4,040,000; Fore River Ship & Engine Co., Quincy, Mass., $4,087,000; William Cramp & Sons' Ship & Engine Building Co., Philadelphia, $4,114,000.

The secretary concluded to award the contract to the Newport News company upon its bid of $3,990,000. The ship building company has challenged the navy department to turn out the Connecticut in the same length of time that it turns out the Louisiana. It is understood that the secretary, while not an advocate of the government construction of warships, will make every effort to distance the ship building company in the building of these sister battleships. The dimensions of the Louisiana and Connecticut will be as follows: Length, 450 ft.; breadth, 76 ft. 10 in.; depth, 26 ft 9 in.; displacement, 16,000 tons. A study of these figures will show that they exceed the Georgia class by 1,000, the Rhode Island by 1,400, the Kearsarge and Wisconsin classes by 4,475, the Oregon by 5,712 and the old Texas by nearly 10,000. Of the main batteries there are to be placed on the new battleships, in turrets fore-and-aft they will carry in pairs four of the latest type of the 12-in. guns. The turrets will be of the elliptical type, electrically controlled and balanced, each of them with an arc of fire of about 270. Next in importance comes the eight 8-in. guns, which will also be in pairs, and will be mounted in turrets controlled in the same way as the 12-in. turrets. They will be located at each end of the superstructure, that is two on each beam. The twelve 7-in. guns, which with the 12 and 8-in. guns, constitute the main battery, will be arranged broadside on the pedestaled mounts on the gun deck and will be protected by 7-in. armor. Each will be isolated by splinter bulkheads of nickel of from 1½ to 2 in. thickness, the forward and after guns being arranged to fire right ahead or right astern, respectively the remaining guns having the usual broadside train. The secondary battery is to consist of twenty 3-in., twelve 3-pounder semi-automatic, six 1-pounder automatic, two caliber .30 machines, two 3-in. field, and six automatic 30-caliber guns. The vessels will not carry a torpedo outfit.

The propelling machinery will consist of vertical twin-screw, four-cylinder, triple-expansion engines, furnished with steam from twelve Babcock & Wilcox water-tube boilers.

SHIP CONSTRUCTION DURING SEPTEMBER

The bureau of navigation, treasury department, reports 123 vessels of 43,743 gross tons built in the United States and officially numbered during September as follows:

	WOOD.				STEEL.				TOTAL.	
	SAIL.		STEAM.		SAIL.		STEAM.			
	No.	Gross.	No.	Gross.	No.	Gross.	No.	Gross.	No	Gross.
Atlantic & gulf	58	6,316	23	944	1	5,218	5	22,052	87	34,530
Porto Rico	2	12	....	....	...	.. ...	...	...	2	12
Pacific	5	1,065	9	477	..	....	....	.....	14	1,542
Hawaii	....	....	1	7	....	...	....		1	7
Great lakes	4	97	5	136	....	....	2	7,092	11	7,325
Western rivers		....	7	265		....	1	62	8	327
Total	69	7,490	45	1,829	1	5,218	8	29,206	123	43,743

The largest steel vessels included in these figures were the Finland of the American Line, the Texas of the American-Hawaiian Steamship Co.'s fleet, the seven-masted schooner Thomas W. Lawson and the lake freighter Frank H. Goodyear.

TWENTY-FIVE MILLIONS OF IRON ORE

It is now more than probable that the output of iron ore from the Lake Superior mining region in 1902 will be full 25,000,000 gross tons, as against 20,500,000 tons last year The shipments to Oct. 1 of this year aggregate 20,708,610 tons compared with 15,157,105 tons on the same date a year ago. The gain is 5,551,505 tons. In September the mines sent forward 3,657,080 tons, compared with 2,893,669 tons for the same month in 1901, which is an increase of 763,411 tons or 26 per cent.

Information is wanted as to the whereabouts of a sailor named Thomas P. Kinniburgh, who was last heard from as being discharged from the Marine hospital at Sault Ste. Marie, July 7. Stanley B. Smith & Co, well-known coal dealers of Detroit, have important information to communicate to him.

LIQUID FUEL.

Lieut. Charles L. Poor in the Naval Annual.

Much attention has been paid during the past year to the subject of liquid fuel firing for marine boilers. The recent great discoveries of oil in Texas, California, Japan and Canada, and the exploitation of the Borneo and Russian fields have given a great impetus to this branch of engineering. Hitherto the lack of fields and their practical monopoly by one or two nations have been a great hindrance to any extensive adoption of oil-firing by nations not having fields of their own, and whose fuel supply might be cut off in war time. Indeed, this still acts as a barrier to the extension of the system on a large scale other than as an accessory to or in conjunction with coal burning.

Though Russia remains naturally the leading exponent of liquid fuel, and has exclusively adopted oil-firing for her Caspian and to some extent for her Black sea fleets, France, Italy, Germany, Holland, Sweden, and Great Britain have all been making thorough experiments in this direction.

In Great Britain the trials with the destroyer Surly have been continued throughout the year. The vessel, fitted with

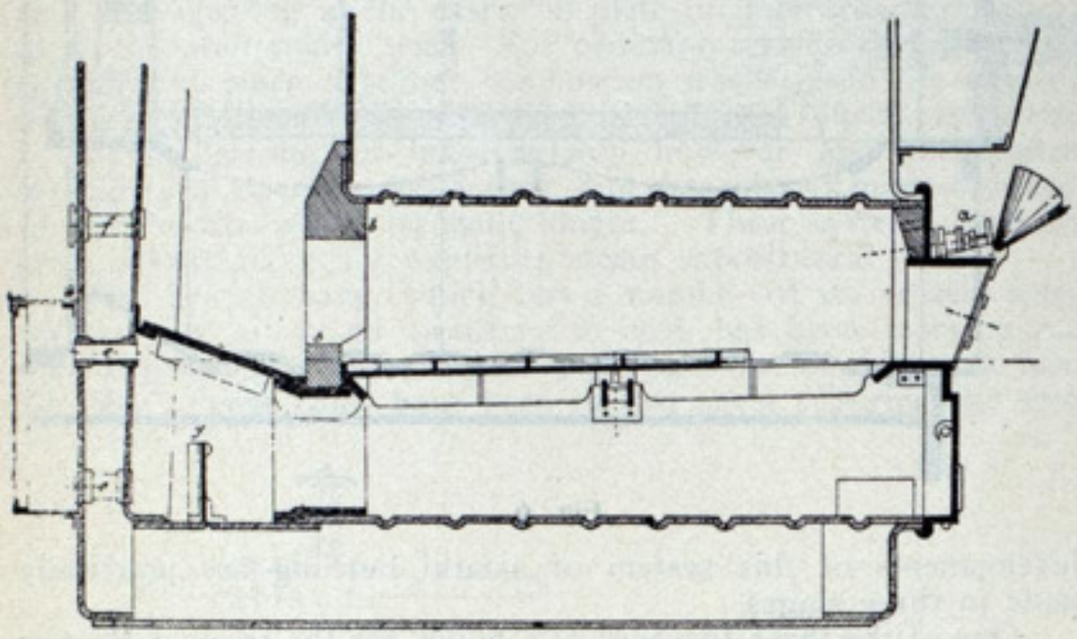


Fig. 2.

Rusden & Eccles and Holden burners, use oil as an auxiliary to coal. The burners, grate arrangement, and auxiliary fittings have been modified in various ways, but the vessel continues to give forth dense black smoke, whether Borneo or American oil is used. In fact, the smoke question, of little import in the merchant service, seems to be the most serious problem that the naval experimenters have to face. Much would seem to depend upon the arrangement of the furnaces, which should be especially constructed for oil-firing, with suitable fire-brick bridges and deflectors. It is claimed that smoke has been almost entirely eliminated in some of the Russian installations, and the Durr system, using Texas oil, is almost smokeless, so that the objection would not appear to be insuperable.

Great Britain is continuing the Surly experiments, and, in addition, has fitted one of the boilers of the cruiser Blonde for oil-firing, while six of the boilers of the Arrogant are fitted for oil. It is further stated upon good authority that the battleships Mars, Hannibal and Resolution are being fitted with oil burners. In all cases these are to be used in connection with coal and not alone. It is not stated what type or types of burners are to be used in these experiments.

The Swedish government has entered the field by ordering from Yarrow & Co. a 31-knot torpedo boat destroyer of the most modern type, to be fitted with oil-burning apparatus.

The Dutch government has conducted a thorough series of experiments with the torpedo boats Ophir and Panagrano. The boilers of these boats are fitted with supplemental oil-burning apparatus, intended to be used as a reserve for short periods of time when extra speed is required. Ordinarily coal alone is burned. There are three of Holden's liquid fuel burners fitted to each boiler for this emergency operation. The oil is kept in a tank on deck, where, if pierced by shot, the oil would run into the sea without danger of fire in the interior of the boat. A steam spray is used to vaporize the oil. This saves the bulk and trouble of an air compressor, but it is a most undesirable feature on board torpedo vessels, where every drop of fresh water counts. In fact, the steam vaporizer is entirely out of the question for naval use, except as in the case of the vessel under consideration, where it is only used for a short time. The successful naval oil burner of the future will have to use some other method of vaporization. A number of types of burner of this sort are already in successful operation. On a trial with the Panagrano coal only was burned in one run. The air pressure was 1 in.; the stop valve was kept full open. The following were the results obtained: Boiler pressure, 150 lbs. per square inch; pressure in first receiver, 54 lbs.; second receiver, 5.5 lbs; vacuum, 23½ in.; revolutions, 340; speed, 24½ knots. The oil fuel was then started, and as much oil as possible was burned without making smoke, so important a consideration in naval warfare. The rate of combustion for coal was maintained as before. The following results were obtained: Boiler pressure, 180 lbs.; first receiver, 64 lbs.; second receiver, 9 lbs.; vacuum, 23¼ in.; revolutions, 365 per minute; speed, 26½ knots. Thus, by the use of oil, an increase of 2 knots was obtained, and almost instantaneously. Borneo oil was used, the supply being at the rate of 700 lbs. per hour for the two boilers. The total coal consumption was 2,800 lbs. per hour in either case. The oil tank held about 1,100 lbs., or enough for one and one-half hour's run under the above conditions.

A feature that would prove of considerable importance in actual warfare would be the fact that the boilers could be worked at very high rates of evaporation although the fires were in a dirty condition. A torpedo vessel would often have to operate at some little distance from its base, thus necessitating a comparatively long run made at moderately high speed before the final spurt, preceding the discharge of a torpedo, were made. The result would be that grates would be clogged, and it might be

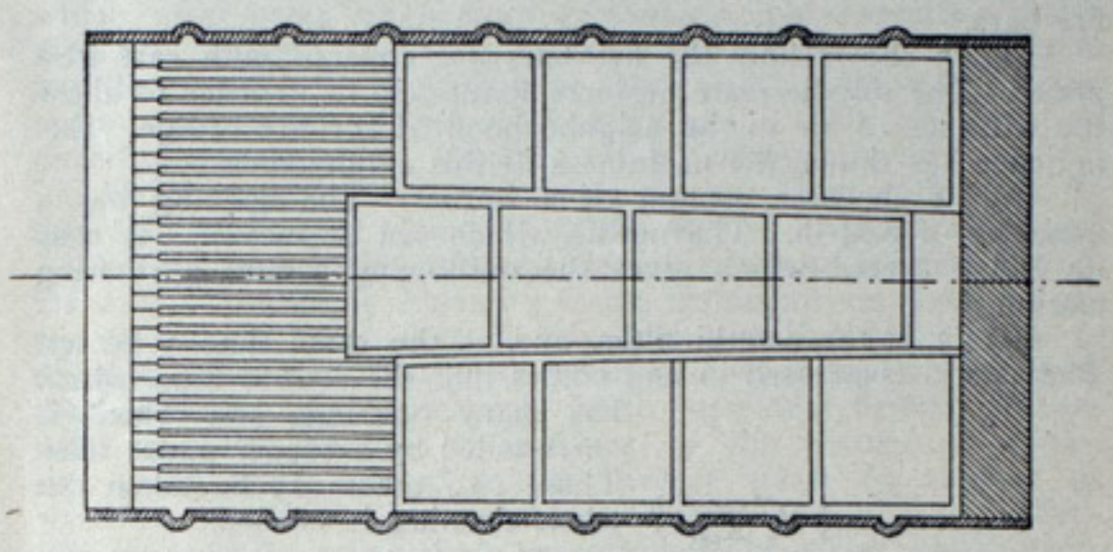


Fig 3.

even advisable to lay off and clean fires before proceeding to action. Such an operation, with the letting down of steam and the creation of smoke, would do very much to endanger the success of the attack, and yet high speed is one of the first essentials to surprise, which, in turn, is a necessary element of approved torpedo-boat practice. With the oil fuel, high speed can be maintained with dirty fires, and also with inferior coal. What is true with torpedo craft is also true of larger vessels under the conditions of service common to them.

It may be pointed out in connection with this matter that the jets for spraying oil into the fire box are placed at a considerably higher level, and consequently there exists, as it were, two layers of fire. The result is the same as if the grate area were largely extended.

On the trials no difficulty was found in avoiding smoke, this being simply a matter of adjustment between the air supply and the amount of oil burned. In a forced-draft stokehole this is easily accomplished so long as the stokers can see the tops of the funnels. It would also appear from observation that the rush of steam and oil vapor into the fire box has the effect of mixing up the gases in the furnace more effectually, and this in itself leads to the prevention of smoke and adds to evaporative efficiency.

The Dutch government has for a number of years been making thorough tests with astatki, the residue of Russian or Borneo oil, using the Korting and Holden systems of burners

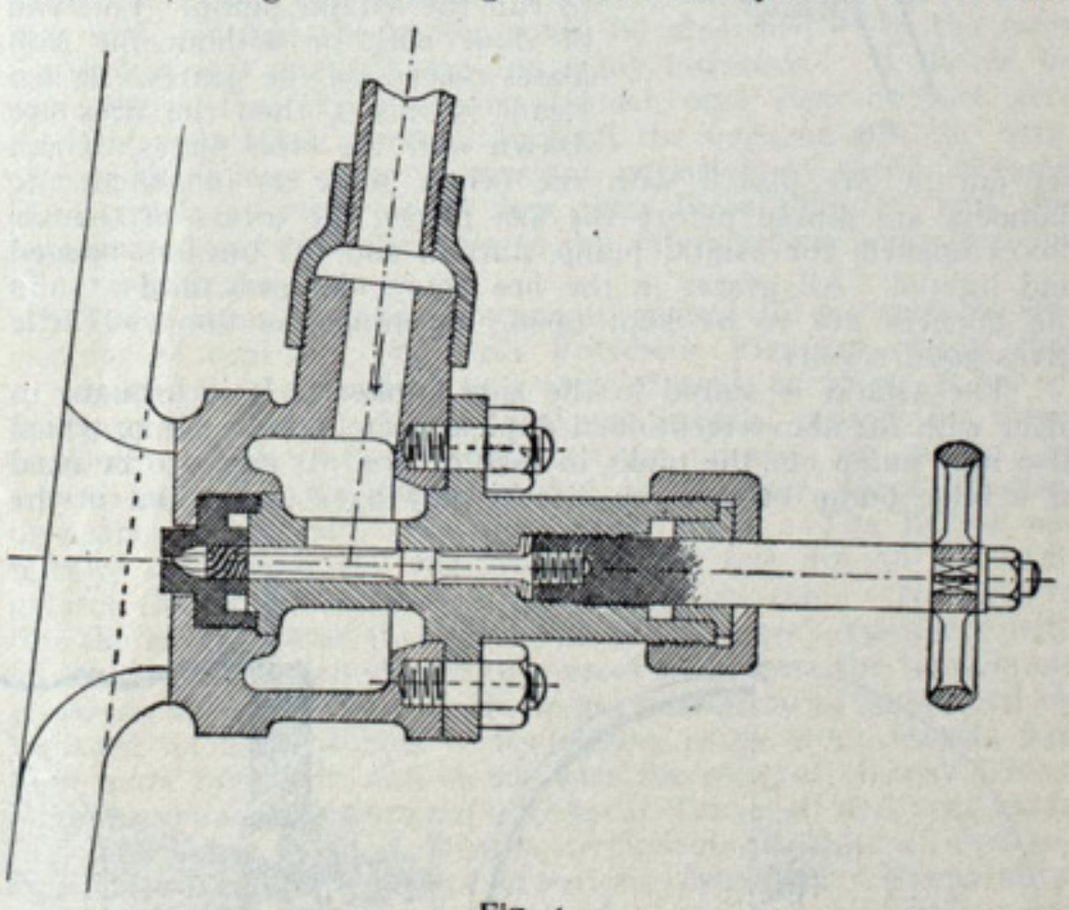


Fig. 4.

to test them, the former being applied in a number of cruisers and revenue steamers and the latter in various torpedo boats. The Korting system, as modified and improved, was installed in the Brak, Dog and Hasenwind, revenue cutters for the Dutch East India Line, that are of the following dimensions: Between perpendiculars, 131.24 ft.; beam, 22.64 ft.; draught on trial, 7 645 ft.; displacement, 322 tons; displacement, fully loaded, 361 tons. The vessels were built in 1898—the Brak and Dog, by Huygen & Gelder, and the Hasenwind, by Fegevoord. The boiler of the Hasenwind is of steel except the tubes and firebox stays, which are of iron. The grate surface is 42.09 sq. ft., and the heating surface, 1,097.96 sq. ft. A Tangey duplex pump near the boiler

has steam cylinders of 4.96 in. and pump cylinders of 2.99 in.; stroke, 5 in. There are two Purcels furnaces, each having a separate combustion chamber. Each furnace has two burners placed on each side and above the furnace door. On the two other sides, however, they are placed in another separate door, which takes the place of the regular furnace door.

Fig. 2 shows: A, astatki burner, under which is a reservoir for collecting the astatki leaking out of the burners; B, fireproof bricks against the lower fire bridge; C, plate closing up the ash pit; D, air box which can be opened at the top; E, iron channels through which the air enters; F, hollow tube covered with mica for observing the flame; G, plate which causes the air coming through the channel E to be heated by forcing it to come to the fire bars.

Fig. 3 shows how the fire bars are covered with cast iron plates. The middle plate projects about 7.89 in. in order to allow the entrance of air in the neighborhood of the fire bridge. Experience has shown the usefulness of this arrangement.

Fig. 4 shows a section of a burner. The opening has a diameter of 0.04 in. The needle, which can be moved, has near its end a thread which gives the outflowing astatki a rotating motion.

Fig. 5 is the astatki filter, and at the same time a heater. The astatki is pressed in and comes into the central tube, which has many openings and which is surrounded by a copper gauze tube. These two tubes can be taken out when cleaning is needed.

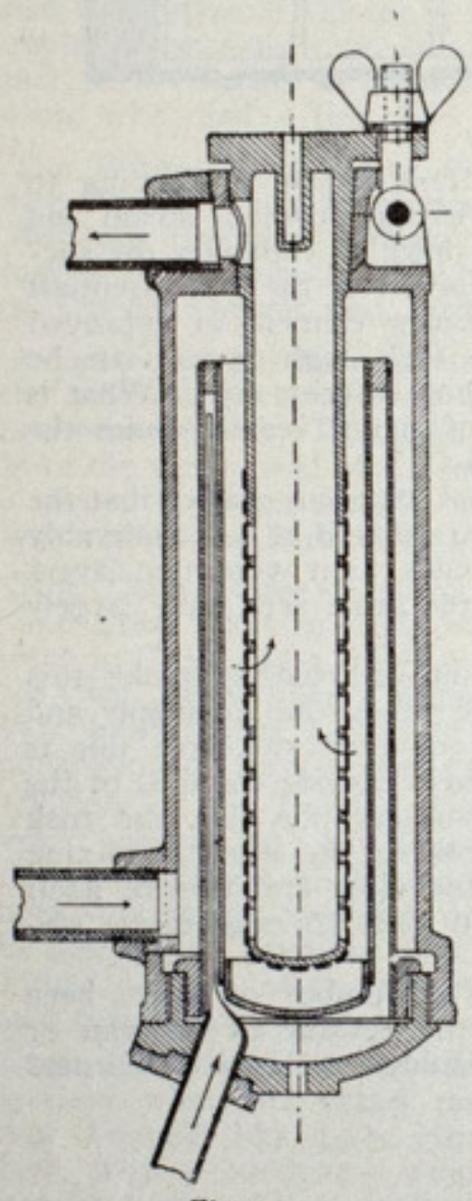


Fig. 5.

The double cylindrical wall which runs around the center body gets the steam for heating the astatki, and is connected with the exhaust steam pipe of the astatki pump.

The astatki is used as follows: The pump draws it from one of the tanks and through a heater, which is like that described, but without copper gauze. It passes then through the pumps and is then pressed through the filter heater to the burners. On the other side, where the astatki leaves the pump, there is an air box in order to obtain a regular pressure. The pressure side of the astatki pipe is connected through a valve with a spring with a drawing slide, so that the pressure of the pipe leading to the burner can be regulated, for which a meter is placed on the steam pipe which heats the astatki.

In order to fire with astatki the following is done: First, steam is raised with coal or wood, so as to run the astatki pump. This can be done with or without the iron plates placed on the grates. When steam is raised, then the fires are drawn out, the iron plates, if not yet put in, are placed with the center plate as indicated, the dampers are placed before the ash plates, the levers of the air boxes opened, the astatki pump started, and the burners opened and lighted. All grates in the fire doors, dampers, and around the burners are to be kept open. Opening the doors a little gives good results.

The astatki is stored in the side bunkers. It is brought in place with the above-mentioned duplex steam astatki pump, which also may pump out the tanks in case of fire. It can also be used as a bilge pump in case the astatki may have leaked out in the boiler room. This is the same pump which brings the astatki to the burners. Within about one hour firing with coal can be replaced by firing with astatki, and during that period firing with one furnace can be continued. In this case the speed of the ship was 7.5 knots; maximum speed about 11 knots, with about 520 I. H. P. Each ship carries about 78 tons of coal, divided between two side and one cross bunker. The side bunkers are used for storing astatki.

The Dutch East India Co. also made modifications in the Korting system, as a result of its experiments. This powerful concern has a very large fleet in the Dutch East Indies, and in view of the abundance of astatki there (Sumatra) a series of trials were made by them which ended in complete success. The developments of this system of astatki burning are practically made in three stages.

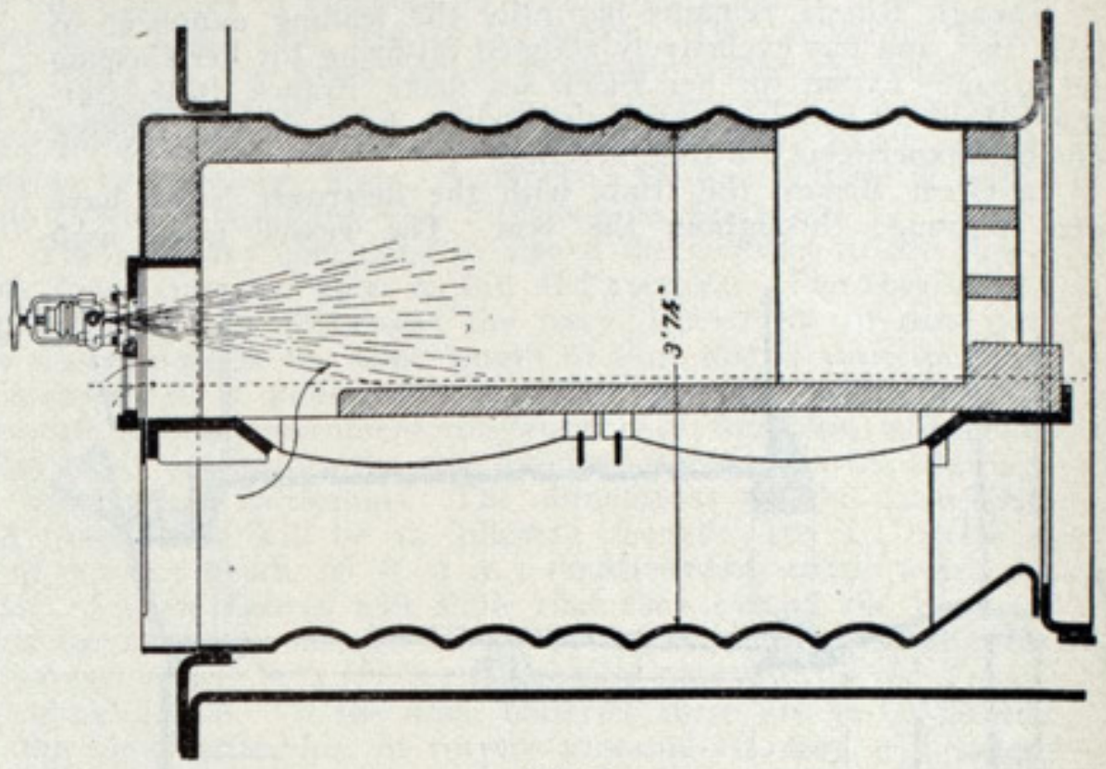


Fig. 6.

One of the three furnaces of a boiler for the steamer Brower was built up as shown in Fig. 6, according to plans furnished by Korting of Hanover. The grates are almost entirely covered by bricks, only forward is an opening through which the air enters. It can also enter through the opening covered by a shutter in the furnace door. The top of the furnace is covered with brick, in order to prevent the flames from cooling off, and on the bridge is also a brick wall with openings. Two Korting burners are placed in the fire door. The results were not bad, but the smoke was very heavy, and the fire-door became red hot. It was then tried to admit air in several other places in the center and aft of the grates, even aft of the bridge. Also the grates were covered entirely with round bricks, in order to get a great many smooth openings; but the smoke remained very heavy. That this was not caused by lack of air was evident, because the smoke remained the same with everything open as it was with the grates covered for three-fourths of the total surface. If this incomplete combustion was not caused by the quantity of air, it could be attributed only to a low temperature at which the combination (air and astatki) took place.

The engineer in charge, Mr. Kloos, then tried to heat the air before it came in contact with the astatki. He placed a plate in the furnace by which the air was brought to the rear end of the astatki. On the grates he placed another plate which, covering everything aft, left an opening forward. This plate became red hot by the flames, the air passing underneath it became warm, and then came in contact with the astatki. The result exceeded expectations. At the top of the furnace no smoke could be seen. As a consequence, a system has been built up based on the same principle.

Fig. 7 shows the furnace as it is built now. In the place of fire bars a cast iron floor is laid, smooth on the top but provided

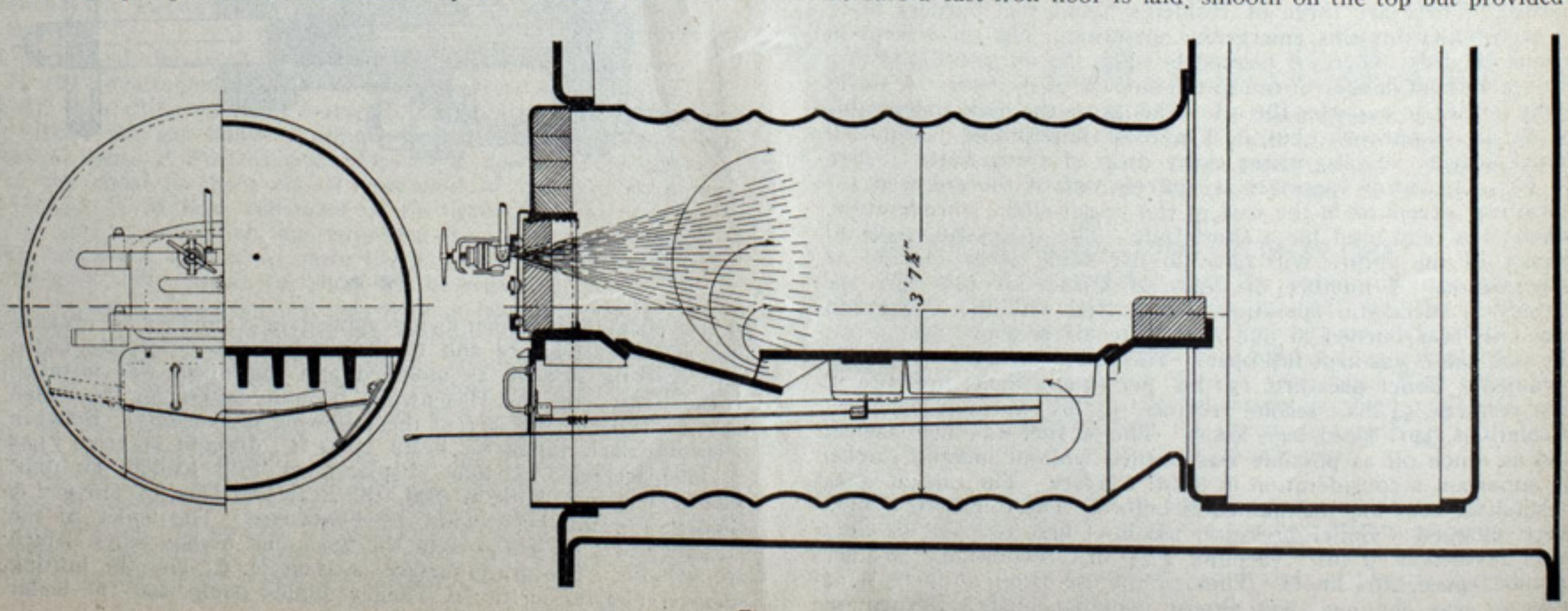


Fig. 7.

with ribs underneath. Therefore, the surface taking up the heat is much smaller than that which emits it, and so the temperature of the iron floor is kept low. Burning of this floor is, therefore, prevented In practice, this floor does not even become dark red. The opening in the floor forward is made small, in order to prevent the air from entering the furnace with great velocity, so that a good combination with the astatki is obtained. The plate in the ash pit under the floor has been given a curved form, in order to gather the astatki continually leaking out from the fire. As this plate has an inclined position, this astatki will drop outside the boiler. The fire door is closed by a thick brick with two openings, corresponding with the opening for the burners in the fire door. During the five hours' trial in the open sea absolutely no work had to be done in the fire room. The temperature of the astatki in the pumps was kept at 194° to 212° F., and the pressure at 40 lbs. The combustion in each furnace was 309 lbs. per hour, which furnished enough steam to keep up the required speed. The smoke was very thin, sometimes hardly visible. At the end of the trial it was desired to make more steam, and therefore the pressure was brought up to 50 lbs. More steam was gotten, but also more smoke, suddenly caused by too little air. The opening in the cast iron plate or floor was fixed at 25 in. at the preliminary trial. For ordinary service this would be enough, but when a higher combustion was desired the opening would be too small. It could not be enlarged during this trial.

Before leaving for Java the ship, however, got other plates, in which the opening was larger, and was placed more forward, so that the ribs would be made longer. These systems have the great advantage of not requiring steam vaporization.

The French navy, which has a number of its vessels fitted for carrying oil as an auxiliary to coal, has been carrying out some experiments with solidified petroleum on board torpedo boat No. 180. These trials have been in two parts. During the first,

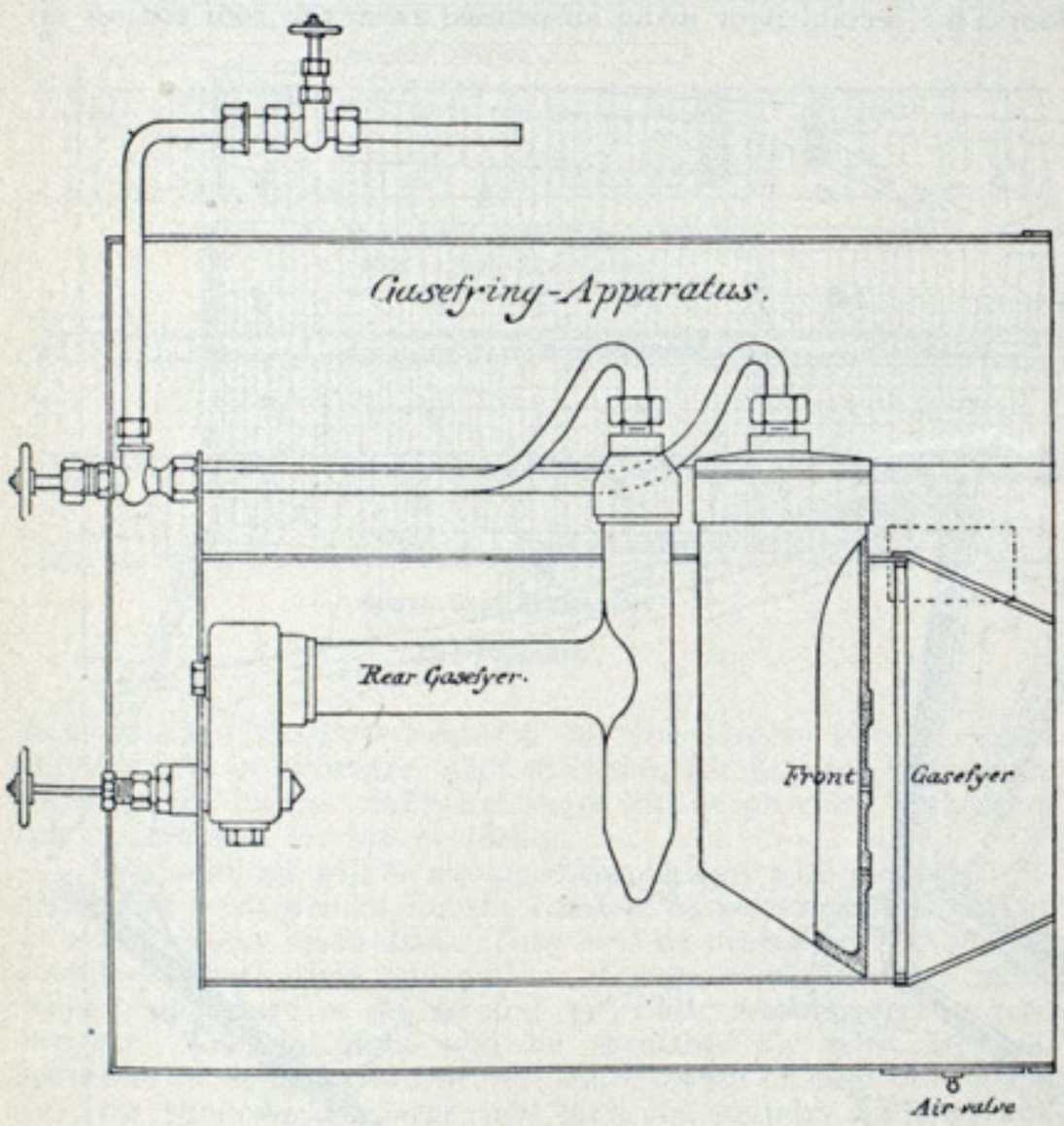


Fig. 8.

ordinary coal and solidified petroleum were burned together, with fair results as to rapid steam generation, but very shortly after the fires were lighted the spaces between the grate bars became choked, showing that a rearrangement of the latter would be imperative.

The second series of tests were effected with the use of solidified petroleum alone. Great difficulty was experienced in firing, and the ordinary firing gear could not be used. The funnels carried a "torch" of flame nearly 2 meters high, and the boat enveloped in a dense cloud of smoke. The grate bars were badly clogged and ten of them burnt out The furnaces gave out an odor of petroleum that was very disagreeable to the fire room force. In spite of these very unfavorable results, further tests are to be made of the apparatus. The French navy has always been partial to petroleum briquettes for reserve fuel, and they are being manufactured in great quantity at St. Etienne and other points in France.

Germany continues to make provision for the carrying of liquid fuel, and the recently launched cruiser Prinz Adelbert has storage for 200 tons of tar oil in addition to her bunker capacity for 1,500 tons of coal. Since the grounding accident to the battleship Kaiser Friederich III, there has been question as to the advisability of carrying liquid fuel in the double bottom of ships, but the German authorities have found no better place in which to carry liquid fuel, most of their battleships having in the neighborhood of 100 tons of "masut" (tar oil) or, more recently, Texas oil. In the future, to obviate such disasters, it has been ordered that oil tanks in double bottoms should only be filled to 75 per cent. of their full capacity. In this manner, in case of striking a rock or other obstacle, the bottom will only be indented to the extent of forcing the air out of the upper part of the tank. A heavier blow would break the plating, and the oil would not be forced into the ship, but would simply leak out of the tank.

In Germany the Durr system of liquid fuel firing has recently been much improved and is now being successfully tested. Fig. 8 shows the improved form of gasefying apparatus. An essential improvement over the former type consists in having a cleaning arrangement so that the small aperture admitting the oil to be evaporated to gas may be cleansed and thus insure a constant supply of ignited gas to the furnace. Texas oil is used, which, after being freed from sulphur, is noncombustible under 200° F. There is absolutely no smoke whatever with this system and Texas oil. In the first type there was considerable roaring noise made by the flames of burning gas. This has been reduced to a great extent, though it is still quite apparent.

Sir Fortescue Flannery, one of the very best authorities on this subject, read a paper before the British Institute of Naval Architects completely covering recent progress in liquid fuel. Of course Fortescue Flannery is an enthusiast in favor of oil. and so touches but lightly on the difficulties that have arisen so often in experiments with oil for naval use—dense smoke, loud, roaring noises in the furnaces, smell, occasional flaming at funnels, and the danger of rackings to the boilers of explosive gases being formed in the furnace when, by sulphur or water in the oil, the burners are suddenly extinguished. Mention need not be made of the wasteful use of steam vaporization, for this is already obviated by a number of systems, and also the other difficulties are being attacked and seem to be in fair way toward being eliminated.

In the discussion that followed the reading of this paper several valuable and expert opinions were given in regard to the difficulties and advantages of the system of oil firing. In regard to the question of water in the oil, it was pointed out that the residue burned was the product of distilled at 400° F., and that therefore with ordinary care the oil should contain no water. It was also noted that boilers in the merchant marine and in naval vessels were so different that it was difficult to compare them. The makers of mercantile boilers are not confined by the same restrictions, and the boilers can be made roomy enough for full power as a regular thing. This has an important bearing upon liquid fuel. In mercantile vessels the ratio of 2½ lbs. of fuel per cubic foot of combustion space per hour might be taken; in H. M. S. Surly's boilers they burnt 12 lbs. per cubic foot of space.

For perfect combustion it was necessary to have the required quantity of air, and in regard to this there was a point to be observed as to where the air should be admitted. It was quite possible to get over-heating in the uptake and retard combustion if air were admitted improperly. With a sufficiently large furnace it was thought combustion with oil fuel should come very near perfection. Again, it was necessary to have a certain amount of brickwork, and that could be got in a mercantile boiler easily, but not so easily in a naval boiler. It was claimed that with oil fuel the stoker could be abolished. In the navy the stoker was a good man for many purposes. It should be remembered that the merchant steamer, once clear of port, proceeds at a uniform speed throughout the voyage. In the man-of-war there was often a constant variation of speed, changes being made at intervals of less than three minutes, and this necessitated constant attention to the valves which controlled the oil supply to the furnace.

There were varying opinions in regard to the relative efficiencies of coal and oil. Sir Fortescue Flannery claims that 2 tons of oil is equivalent to 3 tons of coal, or 36 cu. ft. of oil is equal to 67 cu. ft. of coal, as usually stored in ships' bunkers, which would increase the range of action of a war ship by 50 per cent. for the bunker space allotted. or nearly 90 per cent. upon the bunker space. The British admiralty considered the fuel value of oil was not 50 per cent. greater than coal, but only a possible 33 per cent. In reply to this the author stated that the result of six years' experience with merchant vessels had shown 16 tons of oil to give the same horse power as 25 tons of coal On larger vessels 29 to 30 tons of oil replaced 43 tons of coal. Experience with other vessels had been more favorable, and in one case the ratio of oil was 3 to 2. Recent exhaustive comparative tests of Texas oil and coal made in a land boiler by Prof. Denton, of Stevens Institute of Technology, Hoboken, N. J., have given the following: Evaporation per pound of coal from and at 212°, 9.17 lbs.; evaporation per pound of oil from and at 212°, 15.1 lbs.; or 1,362 lbs. of oil is equivalent to 2,240 lbs. of coal, which gives at a ratio of efficiency of oil to coal of 1.65. These tests were conducted with great care and under the best possible conditions.

A story entitled "The Professor on Shipboard," which has been appearing in Marine Engineering, has been issued in book form by that publication. Many practical men will read a story but steer clear of a serious article which may, perhaps, cover the same subject. The purpose of the book has been to give as much practical information as possible regarding the handling and care of marine boilers and engines.

CITY TO BE BUILT AROUND SHOPS.

The remarkable growth of the affiliated Westinghouse industries was recently signalized by the creation of a new city, and the building of another Westinghouse manufacturing plant. The new industrial center is located about 17 miles east of Pittsburg on the Pennsylvania railway, and is to be known as Trafford City. Extensive factory sites have been laid out here to provide for the overflow of the several Westinghouse industries, a number of which have already used up all the available building room at their present locations and are still pressed for space. The first of the Westinghouse companies to erect buildings in the new city is the Westinghouse Foundry Co., which is at present putting up the extensive and model foundry plant and pattern shop described in this article. This addition is necessitated by the rapidly increasing business of the Westinghouse Machine Co. especially in connection with very large steam and gas engines and steam turbines. Before taking up the foundry itself, a short account will be given of Trafford City.

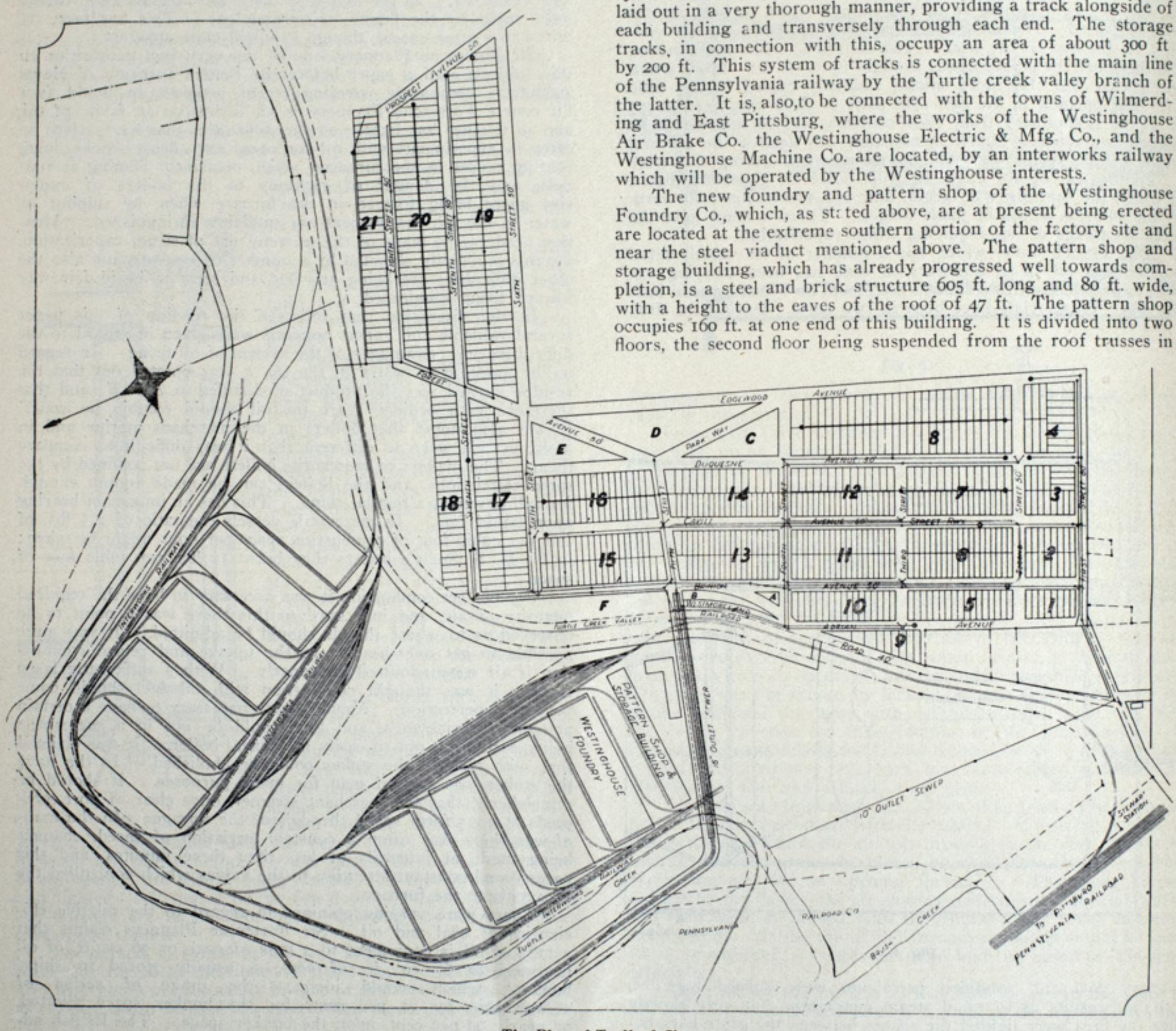
In laying out this city, provision has been made, not only for the factories that are to be erected there, but also for homes and all modern improvements and comforts for the men who are to work in the factories. The latter will be located on a fairly level area between the Pennsylvania railroad and the residence portion of the city, which will be reached from the railway station by a steel viaduct 1,100 ft. long. The residence district has been laid out upon hillsides and a generally level plateau, high enough above the factory sites to render it free from smoke and dirt. The city consists of two oblong areas, one of which is about ½ mile by 1/5 mile and the other ½ mile by 1/7 mile, the two areas meeting in such a way as to form a reversed letter "L," the corner of which is the most northerly part. The town has been laid off into about 800 building lots, each with an average frontage of about 30 ft. and a depth of 100 ft. In addition to this space has been left for six parks. The entire town has been provided with waterworks and sewerage systems, the latter including separate storm water and sanitary sewers. This work, as well as the paving of the streets, was completed before the city was thrown open to settlement. The latter event which took place on June 7, 1902, recalled in many ways the famous booms of the far west. Many of the intending purchasers of the lots came to the site of the future city a day before the sale was to commence and "squatted" on the ground which they wished to possess.

The new town is connected with Pittsburg by the Pennsylvania railway, over which there are forty-six local passenger trains going each way daily and reaching the center of the city in from twenty-five to thirty-five minutes. In addition a street railway line has been built, connecting with the Pittsburg Railway Co.'s line at Wilmerding, 2½ miles distant. This street railway passes over the steel viaduct into Trafford City and forms a loop through the principal streets.

The factory site located on a bend of Turtle creek, provides room for nine factory buildings, each about 200 ft. by 800 ft. A system of railway yards and tracks serving this area has been laid out in a very thorough manner, providing a track alongside of each building and transversely through each end. The storage tracks, in connection with this, occupy an area of about 300 ft by 200 ft. This system of tracks is connected with the main line of the Pennsylvania railway by the Turtle creek valley branch of the latter. It is, also,to be connected with the towns of Wilmerding and East Pittsburg, where the works of the Westinghouse Air Brake Co. the Westinghouse Electric & Mfg Co., and the Westinghouse Machine Co. are located, by an interworks railway which will be operated by the Westinghouse interests.

The new foundry and pattern shop of the Westinghouse Foundry Co., which, as stated above, are at present being erected are located at the extreme southern portion of the factory site and near the steel viaduct mentioned above. The pattern shop and storage building, which has already progressed well towards completion, is a steel and brick structure 605 ft. long and 80 ft. wide, with a height to the eaves of the roof of 47 ft. The pattern shop occupies 160 ft. at one end of this building. It is divided into two floors, the second floor being suspended from the roof trusses in order that the first story may be entirely free from columns, thus providing ample space for handling the largest patterns The remaining 447 ft. of the building is to be used for the storage of patterns and has three floors, the two upper floors being supported on steel columns and the entire space being divided by the interior fire walls into three separate compartments. The foundations are of concrete and the superstructure of steel and brick. The foundation of the ground floor is made up of 8 in. of concrete, into which the floor sleepers are bedded, and on top of these is a layer of 2-in. maple flooring. The upper floors in both the pattern shop and storage building are supported on steel beams and steel girders, and are made up of 3-in. yellow pine flooring covered by one thickness of maple flooring. The roof purlins are steel I-beams spaced 8 ft. center to center, and covered with 3-in. roof sheeting, which is covered with slate.

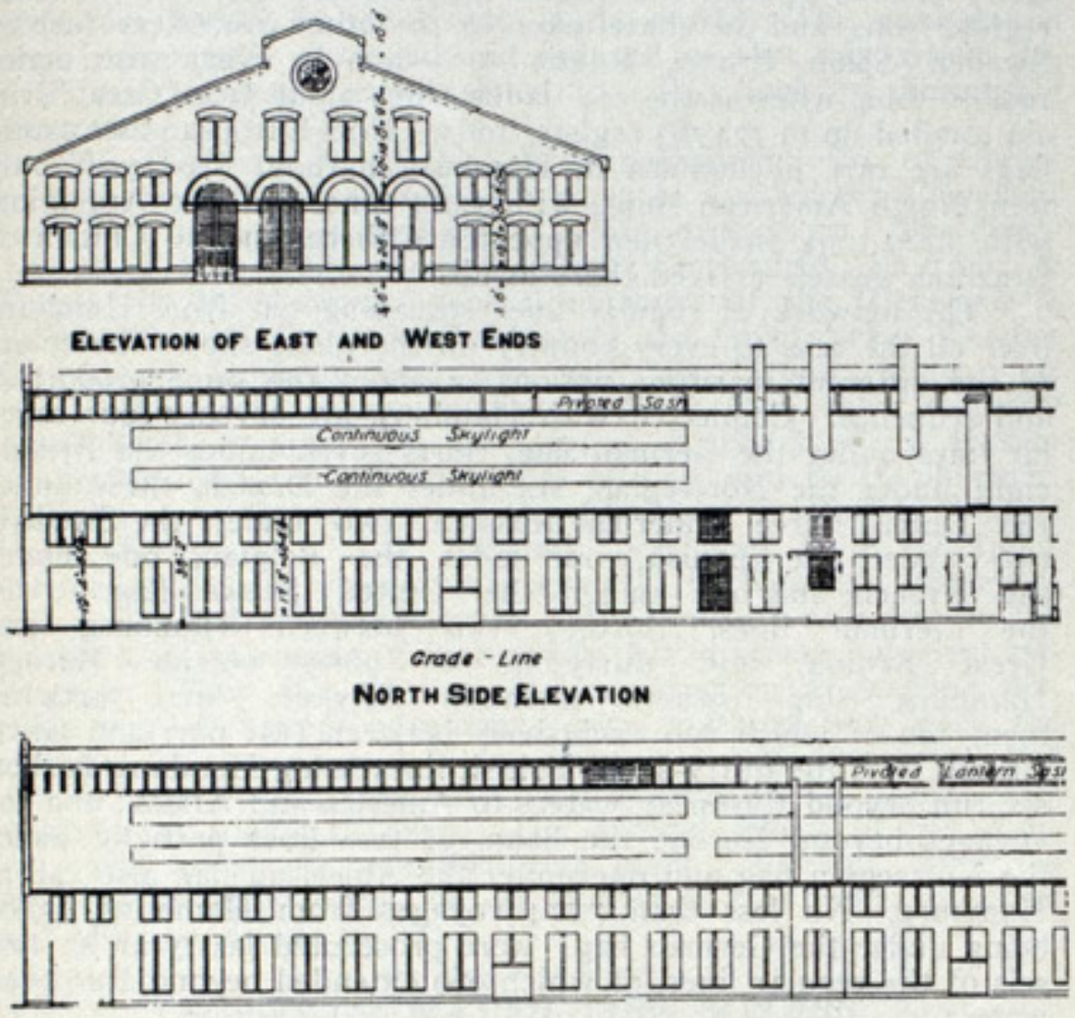
The foundry building is 611 ft. 8 in. long, and 184 ft. 3 in. wide outside of the brick walls, which are 35 ft. high at the eaves and 80 ft. at the peak. As in the case of the pattern shop, the foundations are built of concrete and the superstructure of steel and brick. The foundry is divided transversely into three bays, the center bay being 80 ft. 3 in. wide between centers of columns, runways being provided for the traveling cranes of 80 ft. span and 150



The Plan of Trafford City.

tons lifting capacity. The cranes will be electrically driven. The two side bays are each 50 ft. 6 in. wide from center to center of columns and are provided with runways for traveling cranes of 47 ft. 2½ in. span and 50 tons lifting capacity. At one side of the foundry building runways are provided for yard traveling cranes of 100 ft. span and a lifting capacity of 75 tons. The I-beam purlines are spaced 8 ft. center and center and are covered with 3-in. yellow pine roof sheeting. The roof is covered with slate.

At the middle of one of the side bays, where the cupolas are located, is a charging floor about 50 ft. square, constructed entirely of steel. The melting equipment of the foundry will consist of two air furnaces, each having a capacity of 30 tons, and three cupolas capable of melting 18 tons per hour each. This will enable a casting weighing as much as 100 tons to be easily poured and the casting can afterwards be lifted out of the sand by one of the 150-ton traveling cranes. The air furnaces will be employed for the largest and most important castings, owing to the fact that they yield a superior quality of iron, and the cupolas will be employed for the ordinary classes of castings, and particularly small castings. The building will contain every modern convenience known to the art, making possible the easy and economical handling of all materials, and it is expected to produce



ELEVATION OF EAST AND WEST ENDS

NORTH SIDE ELEVATION

SOUTH SIDE ELEVATION

The Foundry.

such castings as those required for the largest size of steam engines now in existence, with provision for possible increase in sizes for the future. Both buildings will be provided with automatic sprinklers for fire protection.

The buildings will be equipped throughout with modern lavatories and conveniences for the comfort of workmen and will be in every respect up-to-date. They will be heated by hot air, the foundry, pattern shop and pattern storage rooms to have minimum temperature of 50, 60 and 35° Fah., respectively, in zero weather. Artificial light will be furnished by both arc and incandescent lamps. In order to insure plenty of light during the day, the windows are large, and both the foundry building and pattern shop are provided with sky-lights of large area. The plans for the buildings were prepared under the supervision of the Westinghouse Machine Co. The Security Investment Co. of Pittsburg is the financial agent and general contractor for the entire works, and Messrs. James Stewart & Co. of St. Louis and Pittsburg are the managers of construction. The Real Estate Trust Co. of Pittsburg, successfully handled the extensive sale of city lots adjoining the new works.

SHIP YARD NOTES.

A tug for the Central Wharf Towboat Co. has just been launched by the Portland Ship Building Co., Portland, Me. The tug is 94 ft. in length, 20 ft. beam and 10 ft. deep.

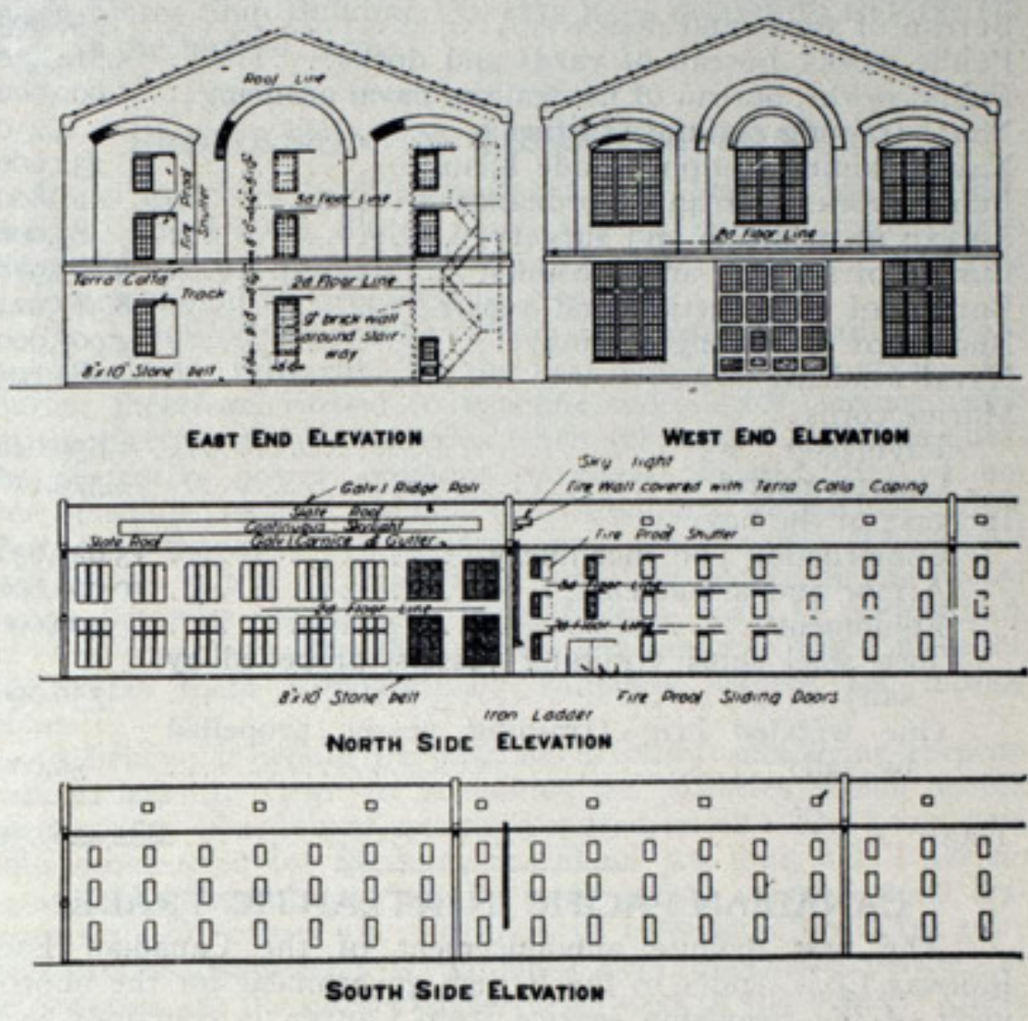
A barkentine, the John C. Myers, building by the Tacoma Ship Building Co., Tacoma, Wash., for Sudden & Christensen of San Francisco was launched last week. She is 176 ft. long, 40 ft. beam and 15.6 ft. deep. Her contract price is $57,300.

I. L. Snow & Co., Rockland, Me., will launch the three-masted wooden schooner Bisbee this week. Her dimensions are: Length over all, 140 ft; keel, 125 ft.; beam, 32 ft.; depth, 9.8 ft. She is fitted with an engine and boiler supplied by the Bath Iron Works, and has a Knowlton Bros. steam windlass.

The Isham Co. of Norwich, Conn., has taken the property just south of the navy yard station on the Thames river, two miles north of New London, and are equipping it with every facility for the manufacture of yachts and gasoline engines. The company has a fine deep-water basin for the storage of large yachts and several thousand feet of storage warehouses for small boats. The company's railway connection is the New York, New Haven & Hartford.

Pusey & Jones, Wilmington, Del., have just completed a side-wheel steamer for the New Bedford, Martha's Vineyard & Nantucket Steamboat Co. She has been christened Uncatena. Her dimensions are: Length, 187 ft.; beam, 31 ft.; depth, 12 ft.; gross tonnage, 652. She has a surface condensing beam engine with cylinder of 42 in. diameter and stroke of 10 ft. Her steam steering gear is of the Williamson Bros. Co.'s make. She is lighted throughout by electricity with a complete installation of the General Electric Co.'s system of 150 16-candle power incandescent lights. Included in the auxiliary machinery is a See hydro pneumatic ash ejector.

The United States Ship Building Co. has recently closed a contract for a new steel ferryboat for the New Jersey Central Railroad to be a duplicate of the three boats, Lakewood, Bound Brook and Red Bank. Her dimensions will be: Length over all, 207 ft.; beam, molded, 44 ft.; beam, over guards, 65 ft.; depth, molded, 17 ft. 3 in. She will have two decks with saloon on the upper deck. Motive power will be supplied by one triple-expansion, four-cylinder engine, cylinders to be 19, 30, 35 and 35 in. with 30 in. stroke. The hull will be built at the Crescent ship



EAST END ELEVATION

WEST END ELEVATION

NORTH SIDE ELEVATION

SOUTH SIDE ELEVATION

The Pattern Shop.

yard, Elizabethport, N. J., and the machinery and boilers at the works of the Harlan & Hollingsworth Co., Wilmington, Del.

The American-Hawaiian Steamship Co.'s 8,000-ton oil-burning freighter Arizona, was recently launched at the ship yard of the Union Iron Works, San Francisco. The Arizona is a sister ship of the Alaskan, also built at the Union Iron Works and launched about a year ago. She is 486.5 ft. over all, 57-ft. beam and 32 ft. deep. Her engines are twin-screw, quadruple-expansion, with cylinders of 28, 38 and 60 in. diameter and 30 in. stroke. She will have three single boilers and will be equipped with the Howden system of forced draft. The twin propellers will each have four blades with a surface of 61 sq. ft. She will carry 11,000 tons deadweight of cargo and will run between San-Francisco, Honolulu and New York.

Arthur Sewall & Co., Bath, Me., launched the four-masted steel barge No. 93 for the Standard Oil Co. last week. The vessel is of the following dimensions: Length, 295.3 ft.; beam, 45.2 ft.; depth, 26.3 ft. The barge has four hollow steel masts, while the foremast is somewhat larger in circumference than the others, being built to serve in the dual capacity of mast and smokestack. For this reason great caution was taken in stepping it, so as to prevent any accident at sea in a storm, and its connection with the boiler has been put under the strongest tests. The vessel is equipped with a Scotch boiler, 11 by 11 ft., and has steam steering gear, towing machine made by the American Ship Windlass Co. of Providence, and towing bitts. She is designed for the oriental oil trade and has a capacity of 1,450,000 gallons of oil.

The Wellman-Seaver-Morgan Engineering Co., Cleveland, has secured the contract to erect an ore storage building with handling machinery at the plant of the Union Steel Co. at Donora, Pa. The storage house will have a capacity for housing 500,000 tons of ore. The stock house will be kept at an even temperature of 45° during the winter time, to insure easy handling of the ore.

The fleet of lighters purchased from the Cleveland Steel Canal Boat Co. by the Philippine Transportation & Construction Co. of New York, and Manila, for use in the Philippine Islands, has arrived there and is now in service.

NAVAL PROGRAM.

Secretary Moody's ship building program, to be submitted to Congress at the beginning of the next session, does not include provision for any armored vessels. His estimates for the expenses of the navy for the next fiscal year embrace only $800,000 for new ships, these to be small vessels to be used for training purposes. It is expected, however, that the secretary in his annual report will indicate his willingness to favor appropriations for battleships and armored cruisers if congress will first authorize an adequate increase in the number of officers. This is regarded as a matter of first importance confronting the naval administration and Mr. Moody thinks it would be unwise to undertake the construction of any more fighting vessels when there are not enough officers to take charge of those already built. A great increase is noted in the estimates of the ordnance bureau for target practice ammunition, due to the coming maneuvers in the Caribbean sea. The estimates are as follows:

Pay of the navy	$17,106,099.00
Miscellaneous pay	600,000 00
Contingent (navy)	10,000.00
Emergency fund	100,000.00
Bureau of navigation	1,157,125.00
Bureau of ordnance	2,761,006.75
Bureau of equipment	6,018,602.52
Bureau of yards and docks	758,903.70
Public works, bureau of yards and docks	5,814,440.00
Public works, bureau of navigation, naval academy	1,000,000.00
Naval training station, California	4,250.00
Naval training station, Rhode Island	232,000.00
Public works, bureau of ordnance	421,800.00
Bureau of medicine and surgery	485,000.00
Bureau of supplies and accounts	3,853,978.34
Bureau of construction and repair	8,367,024.25
Bureau of steam engineering	4,007,900 00
Naval academy	284,105.77
Marine corps:	
Paymaster	1,839,046.75
Quartermaster	1,379,116.50
Increase of the navy:	
Construction and machinery	15,025,632.00
Armor and armament	10,000,000.00
Equipment	400,000.00
Two steel ships (training vessels, propelled by sail)	750,000.00
One wooden brig (training vessel, propelled by sail)	50,000.00
Total	$82,426,030.58

CANADIAN PACIFIC IN ATLANTIC TRADE.

The first definite announcement of the Canadian Pacific Railway Co.'s tender to the British government for the improvement of the steamship service from Canada is contained in the report of Sir Thomas Shaughnessy, president of the railway, to the stockholders. The meeting was held at Montreal last week. The report indicates that the railway company is prepared to meet the situation without governmental support. Following is the statement regarding the fast Atlantic steamship service:

"When the subject of an improved Atlantic service between Great Britain and Canada was receiving consideration in London, your directors thought it wise to submit to the Canadian government on behalf of the company a proposition to provide what they believe to be the best and most practicable service under existing conditions. The company offered, subject to certain traffic arrangements, to establish a weekly service of 20-knot steamships between Liverpool and a St. Lawrence port during the summer months, Halifax to be the Canadian port during the winter months, for a subsidy of £265,000 sterling a year during the first ten years, with a graduated reduction in the amount of subsidy during each of the two following periods of five years, the ships to be most modern in every respect and to be built especially for the route. In addition to this, the company signified its willingness to furnish a fleet of modern freight steamers of 10,000 tons capacity each, sailing at a speed of about 12 or 13 knots per hour, serving Canadian ports.

"Up to the present time your directors have no information as to the policy likely to be adopted by the government. It is evident, however, that whatever may be the outcome of the negotiations for the fast mail service, the rapid growth of your export tonnage and the necessity for being in a position to meet the rates of any of your competitors, make it imperative that your company be so situated on the Atlantic that it can quote through rates of freight and give through bills of lading without being compelled to negotiate for space and rates with independent steamship lines. To that end there will be submitted for your approval a resolution authorizing the directors to make arrangements for the charter or control of vessels if and when, in their opinion, they are required for the protection of the company's freight interests on the Atlantic ocean. It is not expected, of course, that these freight vessels, when provided, will receive any government subsidy, therefore, there will be no restrictions to prevent your company from running them between such ports as may best suit the purposes of the company."

A resolution was subsequently adopted by the shareholders giving the directors power to own, charter or to operate a line of steamships across the Atlantic as may be deemed necessary in the interests of the company. The steamers may be 13 knots or 20 knots and they may be leased or bought outright. The new service will be in no way dependent upon any action of the Canadian government looking to the establishment of a fast line of steamers.

HAMBURG'S SEA TRAFFIC.

After many years of steady effort the German flag has at last won first place in Hamburg's sea traffic, overtopping the British flag which, for many years, had held first place. In 1899 the German tonnage exceeded that of foreigners, and in the same year the Hamburg flag elbowed the British flag out of the first place and forced it to take second rank in the shipping trade of the port. The statutes for 1901 show that the German flag with 4,500,000 register tons put all the other flags combined in the shade, and the flag of Hamburg with 3,600,000 tons maintained its superiority over the British flag, which was credited with 2,900,000 tons. The Hamburg and British vessels trading with the port monopolize between them such a large proportion of Hamburg's trade that they overtop the tonnage of Norway, which takes the third rank, twelve-fold and ten-fold respectively. The Norwegian tonnage last year was 296,000, the Danish 137,000, and the Dutch 116,000 register tons, and the share taken by the other countries—such as Sweden, Spain, France, Russia, etc.—was in every case under 100,000 tons, whereas the coal-laden ships alone from Great Britain totalled up to 774,763 register tons. Non-European and exotic flags are rare phenomena in Hamburg harbor. Last year only four North American ships, with 5,984 tons, and two Argentine, with 3,180 tons, made their appearance there, and no Chilian or Brazilian vessels arrived there at all.

The network of regular lines spreading out from Hamburg over all the seas to every country on the globe shows the colors of the different maritime nations in about the same proportion and sequence. Connected with Hamburg are seventy-four regular lines under the German flag, thirty-seven under the British, eight under the Norwegian, six under the Danish, three under the Dutch, three under the Russian, two under the Swedish, two under the Spanish, one under the Belgian, one under the French, and one under the United States flag. Of the German lines, thirteen run between Hamburg and Great Britain, and thirty-one to ports outside Europe. Hamburg ship owners maintain fifty-six lines between them, ten of which run exclusively between that port and Great Britain. Of the thirty-seven British lines using Hamburg harbor, six run beyond European waters to America and Africa; and for voyages beyond Europe the boats of two lines partially under the Norwegian flag and one under the American flag also call at Hamburg. No less than 7,114 voyages from Hamburg (3,882 being under the German flag) were prosecuted last year by vessels of the regular lines, of which 969 extended beyond European waters.

ABANDONMENT OF THE MISSOURI RIVER.

According to the Butte Inter-Mountain, the Missouri river, as an instrument of commerce, appears to be going the way of the buffalo. There was a time when it was of very great importance, especially to Montana. That was before the days of the railroad when ore was taken down to the gulf and floated over to Wales for reduction. The report of Capt. Chittenden, the engineer who supplanted the Missouri river commission, suggests the possibility that engineering will be forced to give up in its long fight with the intractable Missouri, and all efforts cease to make the upper river navigable. This can be done, of course, only by action of congress but it is not improbable that it will be done. Doubtless the abandonment of the river would be less a hardship to the people than it would seem at first glance. The Missouri has never been a stream where normal river rates for transportation could be maintained. Navigation has always been difficult and dangerous.

Steamboating began on the Missouri about 1819. From that time till 1870 193 boats went to the bottom, 151 of them because of snags. Since 1890 there have been but eight boats of large tonnage wrecked, but to keep the channel reasonably free of snags has cost the government many millions of dollars. Notwithstanding the efforts and money expended on it, the traffic on the upper Missouri is small. Last year the freight transported above Sioux City amounted to 68,338,000 lbs, with 11,249 head of cattle and 756 passengers. At the present time there are but eleven steamboats plying on the upper Missouri. They are engaged solely in carrying freight to the nearest railroads. There are stretches of 50 and 75 miles between railroads on the upper river, and to carry the freight to these roads the boats are maintained. The territory and railroads have developed wonderfully, so the traffic for these stretches of isolated country alone exceeds the entire upper river business of a quarter of a century ago.

The trouble with the Missouri river navigation is that it cannot compete with the railroads. Other rivers can, but the Missouri is not built that way.

Frederick S. Brinton has resigned his position as head loftsman at the Crescent ship yard, Elizabethport, N. J., to become constructor with the Marine Construction & Dry Dock Co., Mariner's Harbor, Staten island. The employes of the ship yard presented Mr. Brinton with a gold watch, chain and pendant.

TRADE NOTES.

Mr. T. F. DeGarmo, eastern representative for the Falls Hollow Staybolt Co., Cuyahoga Falls, O., has changed his headquarters from Philadelphia to No. 60 West Ninety-third street, New York.

The Browning Engineering Co., Cleveland, manufacturers of conveying machinery, recently purchased from the Westinghouse Electric & Mfg. Co. a large number of railway-type crane motors, ranging in capacity from 25 to 50 H. P.

The Tuckett Stoker Co. of Wilmington, Del., was chartered at Dover last week to manufacture, sell and equip mechanical stokers. The incorporators are Robert L. Gale, Alfred S. J. Owens of Baltimore and George W. Todd of Wilmington, Del.

The Chicago Pneumatic Tool Co. has issued a new catalogue devoted to the pneumatic hoists formerly manufactured by the Chisholm & Moore Mfg. Co. of Cleveland. Complete descriptions are given of these motor hoists and the little catalogue will be sent to anyone upon application.

The pocket catalogue of the Crane Co. is a substantial book of 464 pages, bound in cloth. It embraces the full line of Crane valves, fittings, steam specialties, engineers' supplies, etc. The company makes upward of 7,000 articles of this description for use with steam, water or gas, and its facilities and varieties of goods are said to be the largest in the world. The catalogue is very conveniently arranged and indexed so that any article desired can be immediately turned to. The book is thoroughly illustrated.

The Hoffman Automobile & Manufacturing Co. of Cleveland was recently purchased by a party of well-known Cleveland capitalists, and reorganized with a capital of $100,000. The directors are: Dan'l. Shurmer, formerly of Scofield, Shurmer & Teagle; T. F. Newman, general manager of the Cleveland & Buffalo Transit Co. and president of the Great Lakes Towing Co.; L. E. Hoffman who was with the former company as vice-president and general manager; A. D. McLachlin, formerly purser of the steamer City of Erie; A. E. Hatch, F. S. Masten of the firm of Goulder, Holding & Masten, and E. D. Shurmer, assistant general manager of the Cleveland & Buffalo Transit Co. Officers are: E. D. Shurmer, president; L. E. Hoffman, vice-president and general manager; T. F. Newman, secretary, and A. D. McLachlin, treasurer. The company now has on the market a steam engine of high grade that is giving universal satisfaction. They also have under construction a gasoline machine that has many advantages over anything now upon the market. This machine will be sold at a very low price, and will, it is promised, meet the popular demand for a first-class runabout at moderate price. The general offices of the company will be at the manufacturing plant, Cleveland, which is complete in every detail and is located at the corner of Lake and Muirson streets.

ROBERTS' WATER-TUBE BOILERS

Our attention has been directed to a coincidence regarding the Roberts' safety water-tube boiler that is certainly worthy of note. Five leading ship builders of the United States who own steam yachts have them equipped with this type of boiler. This is certainly a strong endorsement. The builders are Mr. E. P. Morse of the Morse Iron Works, Mr. C. B. Orcutt of the Newport News Ship Building & Dry Dock Co., Mr. W. G. Nourse of the Marine Iron Works, Mr. Charles E. Hyde of the Bath Iron Works, and Mr. Lewis Nixon of the new coast combination, the United States Ship Building Co. The Union Iron Works of San Francisco, when in need of boilers for their ships a few years ago, adopted and installed the Roberts' boiler without competition, in consequence of its success in vessels which they had built previously and in which they had installed the boiler.

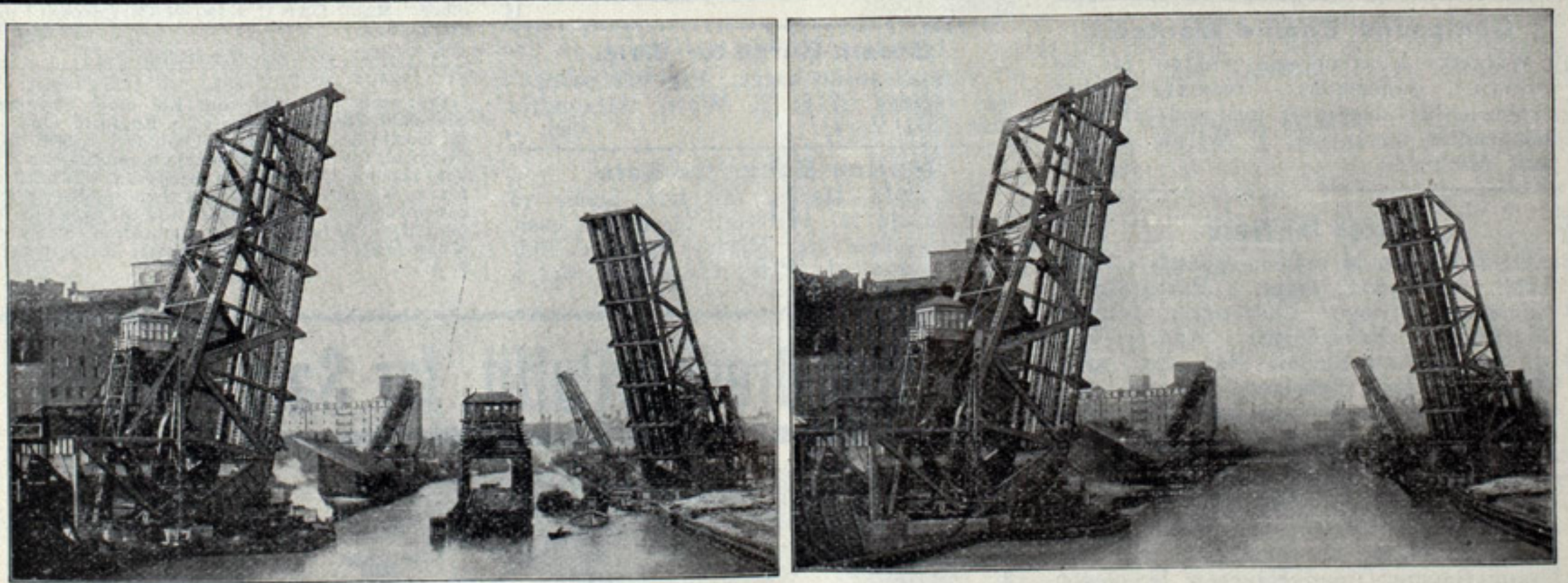
Mr. J. F. Craig of the Craig Ship Building Co., Toledo. recently stated: "We are figuring on building a steam yacht for ourselves to come out next year, and you may rest assured that if the vessel is built she will be equipped with Roberts' boilers." Mr. Hyde says, among other things: "It gives me great pleasure to speak a good word for the Roberts' boiler." Mr. Orcutt says: "I have used a Roberts' boiler in my yacht for ten years or more, and I am much pleased with its performance. Repairs have been almost nill." Mr. Morse says: "I believe it is the best yacht boiler in the market, without exception." Mr. Scott, of the Union Iron Works, replied to an inquiry concerning this boiler as follows: "We are erecting a pair of these boilers in our own works, and we have no hesitancy in endorsing them fully." Mr. Nourse of the Marine Iron Works, Chicago, wrote recently: "Not only from a practical but also a commercial standpoint I consider the Roberts' boiler as the most successful of any of the water tube type." President Nixon of the United States Ship Building Co. says he is pleased to endorse the boiler in the highest terms.

PROPULSION OF SUBMARINE BOATS.

In an interview in Washington Lieut. Com'dr. John R. Edwards of the United States navy, who is known as an expert student of marine propulsion, says that the submarine boats of the future should be propelled by electricity.

"It is impossible to utilize steam for submarine sailing," continued Com'dr. Edwards, "as the heat would be too great. Inventors, therefore, turned to gasoline motors for surface work and the electric storage batteries when submerged. On the question of motive power, opinions of naval officers differ. I believe gasoline motors should be abandoned altogether, while others hold that they are valuable for surface work. These give their boats a radius of action they could not secure by the use of storage batteries exclusively. The French boats, I understand, use electricity alone, but this limits their range to some 40 miles, and makes them comparatively valueless, except for harbor defense.

"I believe it would be possible to build submarine torpedo boats sufficiently large to accommodate batteries which would give a radius of action of several hundred miles. The boats now being constructed for the navy are about 120 tons, and I see no reasons why they should not be built of 200 or more tons displacement. Of course the operation of submarine boats by storage batteries exclusively would be a very expensive matter, as the batteries are the most expensive features of the boats. Those in the Holland cost at least $25,000, and larger ones would be proportionately expensive. "Gasoline as a fluid does not appear to be very dangerous. We have found that liquid gasoline can be handled with comparative safety. You can almost plunge a torch into it without setting it afire."



TWO VIEWS OF

THE SCHERZER ROLLING LIFT BRIDGE

across the Chicago River at entrance to the Grand Central Station, Chicago, before and after the removal of the old center pier swing bridge, showing the obstruction to navigation caused by the center pier and protection pier of the old swing bridge, and the wide and unobstructed channel given by the new Scherzer Rolling Lift Bridge.

Preliminary Sketches and estimates of cost furnished without charge to responsible parties in any part of the world, upon request accompanied by the necessary data.

THE SCHERZER ROLLING LIFT BRIDGE CO., Main Offices: 1616 Monadnock Block, CHICAGO, U.S.A.

HEAVY IMPORTATIONS OF STEEL.

Imports of iron and steel have doubled in the last year, while exports of iron and steel are still falling off. The August import and export figures of the treasury bureau of statistics show that the importations of iron and steel manufactures for the eight months ending with August are $11,000,000 greater than in the corresponding months of last year, while the exportations of iron and steel manufactures are nearly $5,000,000 less than they were in the corresponding months of last year, and $21,000,000 less than in the corresponding months of 1900. In the single month of August the imports increased more than $2,000,000 over those of August, 1901, and at the present rate of gain, the total imports of iron and steel in the calendar year 1902 will exceed those of 1901 by $20,000,000.

Practically every class of iron and steel shows an increase in imports during 1902 as compared with 1901. In the month of August, 1902, the importations of pig iron were 79,447 tons, against 4,301 tons in August of last year; scrap iron, 13,759 tons, against 4,363 tons; steel rails, $53,704 value in August 1902, against $537 in August of last year; ingots, blooms, slabs, billets, and bars of steel, 87,420,104 lbs. against 1,670,519 lbs. in August of last year; wire and articles made therefrom, 520,825 lbs., against 358,750 lbs.; machinery, $343,472, against $171,755 in August of last year. Considering the figures of eight months ending with August, 1902, compared with eight months of 1901, the figures stand: pig iron, $4,676,649, against $886,373; ingots, billets, blooms and bars of steel, $4,783,432, against $863,315; and machinery, $2,824,021, against $1,950,827 in the corresponding months of last year.

On the export side the reduction in many articles is equally striking. Of steel rails the total value of the exports in the eight months ending with August, 1902, is $1,664,422, against $6,715,113 in the corresponding months of last year; railway engines, $2,574,384, against 3,050,246 in the corresponding months of last year; pig iron, $397,421, against $708,283 in the eight months of last year; billets, ingots and blooms, $54,524, against $671,135 in the corresponding months of 1901; steel sheets and plates, 23,818,103 lbs,, against 46,889,367 lbs. in the corresponding months of last year; and iron sheets and plates, 5,965,572 lbs., against 11,910,806 lbs. in the corresponding months of last year.

PITTSBURGH WHITE METAL CO.

MANUFACTURERS OF THE BEST

BABBITT and ANTI-FRICTION

Metals

Known for any Purpose.

Made from the Best Materials.

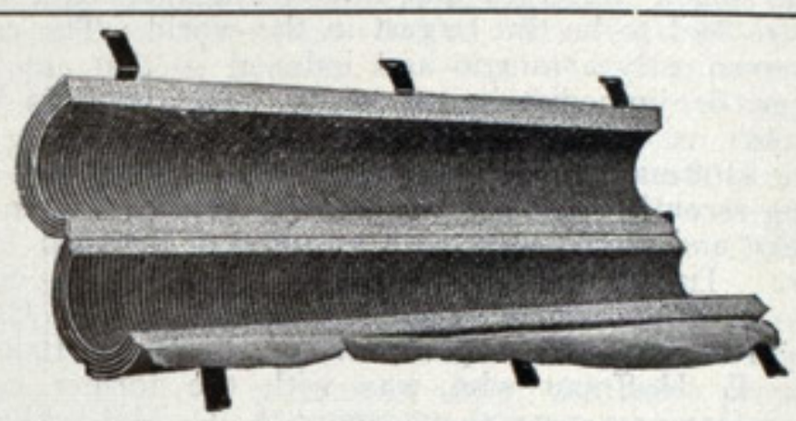
Price and Quality Guaranteed and Always Consistent with the Market.

PITTSBURGH, - PA.

ASBESTOCEL

SECTIONAL PIPE COVERING.

(Patented)



Consists of several layers of corrugated asbestos paper, placed so that the corrugations run **CONCENTRICALLY AROUND THE PIPE.** Each channel, therefore, forms a closed loop, in which the air is effectually imprisoned, instead of forming a long channel through which more or less circulation can take place, as in longitudinal air cells.

These circumferential channels occur between each of the several layers, forming a covering of the highest insulating efficiency.

We manufacture money saving insulating coverings to meet every requirement under all conditions, and should, therefore, be glad of an opportunity to take the question up with you in detail.

Send for Catalogue A, or a representative. Either will come to you promptly.

H. W. JOHNS-MANVILLE CO.,

100 William Street, New York.

MILWAUKEE, CHICAGO, ST LOUIS. BOSTON, PHILADELPHIA. PITTSBURG, CLEVELAND, NEW ORLEANS, LONDON.

Schooner for Sale.

For Sale.—Schooner Helvetia, capacity 1,000,000 ft. of lumber or 1,500 tons of ore. Price $12,000. Inquire of H. J. Johnson, 1015 Society for Savings, Cleveland, O. Oct. 9.

Compound Engine Wanted.

Wanted.—A compound engine of the following dimensions: 10x20x12 inches stroke, either steeple or fore and aft, with independent pump. W. P. Wilson, Saugatuck, Mich. Oct. 9.

Barge for Sale.

Of about 500 M lumber capacity. Rates A2½. In good shape. Practically all rebuilt a year ago. Thoroughly recalked this winter. Price $3,500. Address Box 27, the Marine Review Pub. Co., 39-41 Wade building, Cleveland. tf

Passenger Steamer Wanted.

Wanted.—To lease passenger steamer for next season's business, allowed to carry 500 or 600 passengers, to run on Spring Lake, Michigan, in connection with the Grand Rapids, Grand Haven & Muskegon Third Rail Electric Railway. Address, giving description of boat, Wallace Franklin, Secy., 1014 Union Trust Bldg., Detroit, Mich. Oct. 9.

Small Passenger Steamer Wanted.

Wanted.—A small passenger steamer between 90 and 100 ft. long, with fore-and-aft or triple-compound engine and good boiler. Speed not less than 14 or 15 miles an hour. Address Box 297, Washburn, Wis. Oct. 9.

Scotch Boilers For Sale.

For sale two marine scotch boilers, 10 ft. by 78; triple riveted; ⅝ steel plate dome 6 ft. by 24 in.; ninety-eight 3-in. tubes; stays ⅝ center, allowed 168 lbs steam. Boilers as good as new. For price address, Isaac Applebaum, 410-411 Buhl Block, Detroit, Mich. tf

Steam Barge for Sale.

A small steam barge. For full particulars inquire of F. E. Wood, Alexandria Bay, New York. Oct. 9

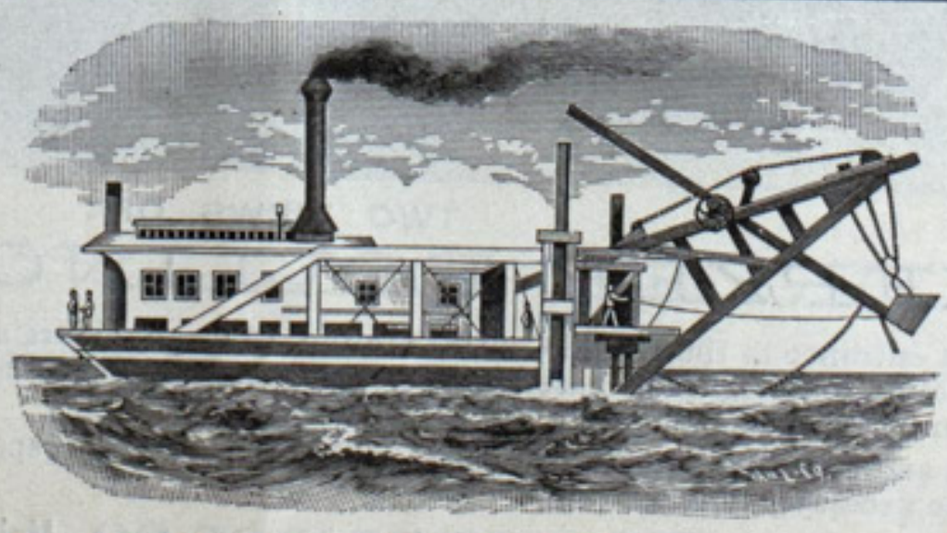
Marine Boiler for Sale.

For Sale—Marine fire box boiler 12 ft. 6 in.x15 ft. Will sell cheap for cash. Address Box 34, Marine Review Pub. Co., 39-41 Wade Bldg., Cleveland. Oct. 9.

Proposals for the improvement and enlargement of Cleveland Harbor, Ohio:—U. S. Engineer Office, No. 185 Euclid Ave., Cleve and, O. October 7, 1902. Sealed proposals for the improvement and enlargement of Cleveland Harbor, Ohio, by extending the main breakwater eastward will be received at this Office until 2 p. m. November 6, 1902, and then publicly opened Specifications, blank forms, and all available information will be furnished on application to this office. Major DAN C. KINGMAN, Corps of Engineers, U. S. A. Oct. 30.

Proposals for improving the main entrance to Cleveland Harbor, Ohio:—U. S. Engineer Office, No. 185 Euclid Ave., Cleveland, Ohio, Oct. 7, 1902. Sealed proposals for improving the main entrance to Cleveland Harbor, Ohio, will be received at this office until 2 p. m. November 6, 1902, and then publicly opened. Specifications, blank forms, and all available information will be furnished on application to this office. Major DAN C. KINGMAN, Corps of Engineers, U. S. A. Oct. 30.

Steam Dredge Outfit for Sale



CONSISTING OF

STEAM DREDGE,

having two buckets, 2 and 3 yds. capacity

Two Dump Scows,
One Boarding Scow,
(Furnished)
One Fuel Scow

complete with all necessary tools and fixtures, patterns and extra castings. All in first-class condition, ready for immediate use.

Located in Detroit, Mich.

Price, - - - $10,000

t. f.

M. MITSHKUN CO., DETROIT, MICH.